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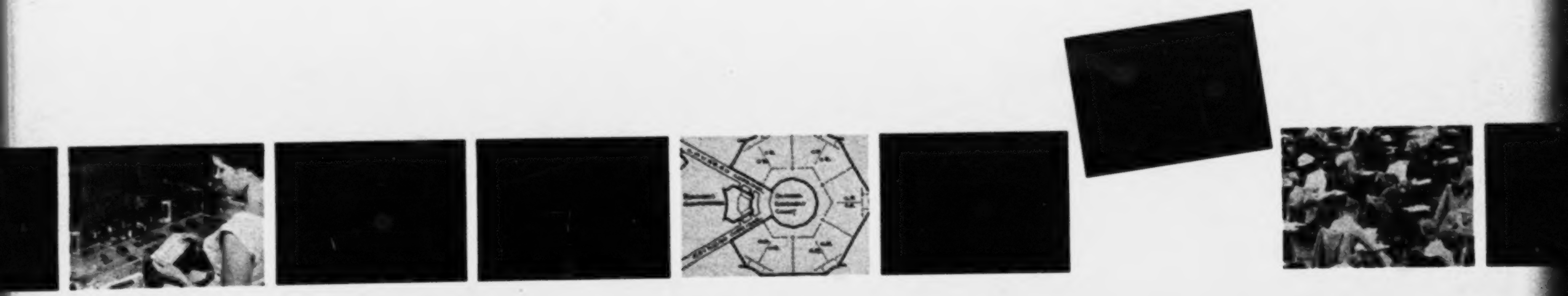
LONG-RANGE PLANNING IN HIGHER EDUCATION



WESTERN INTERSTATE COMMISSION
FOR HIGHER EDUCATION

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Long-Range Planning
in
Higher Education

The papers and discussions of the Sixth Annual Institute on College Self Study for College and University Administrators held at the University of California at Berkeley, July 6-10, 1964. Sponsored by the Western Interstate Commission for Higher Education, Boulder, Colorado, and the Center for the Study of Higher Education, Berkeley, California.

Owen A. Knorr
Editor

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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Western Interstate Commission for Higher Education
University East Campus   Boulder, Colorado 80304

April, 1965

Foreword

The Western Interstate Commission for Higher Education is pleased to publish the proceedings of the Sixth Annual Institute for College and University Administrators, which was held at Berkeley, California, in July, 1964. This marks the fifth year of a remarkably successful collaboration between the Commission and the Center for the Study of Higher Education at the Berkeley campus of the University of California.

In 1959, the Commission, with the co-sponsorship of Stanford University, conducted the first formal conference on institutional research for college and university officials to be held in the Western region. This workshop addressed itself to the subject of *College Self Study*. Since 1960, the Commission has joined with the Center to co-sponsor workshops in a number of areas of interest to administrators in higher education. Publications resulting from these conferences are *Research on College Students* (1960), *Studies of College Faculty* (1961), *The Study of Campus Cultures* (1962), and *The Study of Academic Administration* (1963).

WICHE feels that this continuing series of conferences and publications serves a number of purposes. It is in keeping with the charge in the bylaws of the Commission, which states, "The Commission shall . . . serve as a research facility on institutional and regional problems related to improving higher education" and "serve as a clearing house on information regarding regionally significant activities among institutions and agencies concerned with higher education in the Western region." Furthermore, WICHE has been interested traditionally in helping Western institutions of higher education to help themselves by improving their operations and stretching their educational dollars through institutional research. The contribution to the growing young discipline of institutional research is a fringe benefit of no small consequence.

It is our sincere intention to continue this service to higher education in the West.

April, 1965
Boulder, Colorado

Robert H. Kroepsch
Executive Director

Introduction

In presenting the proceedings of the Sixth Annual College Self Study Institute for College and University Administrators, WICHE departs from the traditional format for similar publications of preceding years. Heretofore, only the formal addresses have been included, although some of the most interesting moments of the conferences have occurred during the discussion of the conferees following the addresses.

This year, we have attempted to capture from the tapes of these discussions those portions we thought were profound, controversial, provocative, humorous, or otherwise of interest to persons in higher education. For technical and other reasons, their authors have not been identified.

It is to be hoped that the present volume will stimulate the sort of long-range planning needed so badly by our institutions of higher education.

Owen A. Knorr,
Editor and Institute Director

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Design and Change in American Higher Education

Homer D. Babbidge, Jr., President
The University of Connecticut

Any activity or object important to people has, figuratively speaking, a thousand faces. The optimist sees a glass half full where the pessimist sees a glass half empty. A New York newspaper recently announced the news of Jim Bunning's perfect pitching effort with the proud headline, "METS LOSE PERFECT GAME." And this tendency to put on one's own choice of face is compounded by the tendency to semantic polarization: to talk in terms of good-or-bad, right-or-wrong. This is the stuff of which issues are made.

And so it is with planning. It is seen from as many different perspectives as there are viewers, and there has been so much attention to the subject in recent years that the phenomenon of polarization has begun to set in. There are advocates and there are opponents, and they come in all shades of coloration. How, then, does one walk around this mountainous subject and do justice to some of the perspectives that have come to be fixed and well delineated. And this, as I understand it, is what I have been asked to do this evening, in opening a conference on the subject of long-range planning in higher education: To run around the mountain, stopping for a minute here and there, to call attention to what one man takes to be a promising view.

I do this with great pleasure. For I see in the subject of planning a key to many of the most profound problems of American higher education. Some of you will think that I dwell too much this evening on the dangers of planning, or more properly, the potentially dangerous consequences of planning. But, believe me, I do so only because these aspects of the subject serve to underscore the critical importance of planning. As in the case of modern medicine and modern science, generally, very little that is worth thinking about and working at is *not* potentially dangerous. It is precisely because the consequences of planning are terribly important, that planning cannot be considered safe. And there's just too much at stake, in terms of the future of our system of higher education, to pretend that planning—however or in whatever spirit conducted—is an educational wonder drug, devoid of side effects.

And so I hope you will keep in mind that I have come across the continent to praise and not to bury this young Caesar.

But let me get on to: "Design and Change in Higher Education."

Let me strike out with temerity and say that we have in the United States a system of higher education that is totally undesigned and which has experienced remarkably little change. And yet we like it pretty well. Indeed, we impute virtue to our totally undesigned system. We admire the patched-quilt pattern that has emerged from an almost total lack of planning (as we know it today). And as for the absence of change, here too we tend to express pride in the fact that we have preserved the eternal verities in the face of hostile forces. Is this sheer rationalization? Are we weaving virtue out of the threads of inadequacy? Or do we have some real reason to be proud of what we have achieved? Let me answer in the spirit of the keynoter by saying that both attitudes are valid, at least partially.

But to accentuate the positive, let me say that in my judgment, we can properly boast that a fascinating design has emerged from our historic unplanning, a design that accurately portrays values long admired in our society, such as individualism, localism, and the spirit of laissez-faire, as examples. And insofar as we seek to modify the design and pattern of American higher education, we must acknowledge that we are doing one of two things: either we are placing less emphasis on those values, or we are seeking new ways to preserve them in the face of larger social changes.

The effects of social change on our American institutions of higher education are difficult to assess. My own view is that institutions themselves are highly resistant to change; that the fact of their establishment identified them as essentially conservative elements in our society. And in order for society to effect significant change in higher education, it has been necessary to bring new institutions into being. We have as classic examples the land-grant institutions of a century ago and the emerging community colleges of today. But, once established, even these new institutions tend to become part of a new orthodoxy, itself resistant to change.

Now the question arises, quite naturally, in what ways will we adapt our educational efforts to the larger social changes that lie ahead? I need not belabor the fact that such changes are in store for us. Simply take any identifiable current social trend —birth rate, automation or whatever—and project it, however crudely, and the consequences for education are obviously dramatic. But don't forget that Adam is reputed to have said to Eve in the Garden of Eden, "Eve, we live in a world of change!" And though rate of change in the years ahead is, quite obviously, going to accelerate, the *fact* of change is something we've had to live with for a long time. And American educational institutions have survived greater social change and have done it more gracefully than have the educational institutions of any other nation.

Now, happily, it is not necessary for me to assign any values to these anticipatable changes, since planning for the future is vitally important, whether we seek to accelerate social change, or to resist social change, or simply to accept social change. It is important for us as individuals to decide what our attitudes are to be on these matters; but our institutional interest in change will not be diminished, nor our need to anticipate these changes insofar as we can, by the fact that we like or we don't like what we see in the crystal ball. For no educational institution is to be spared the impact of change in the years ahead, and even those most determined to resist it do well to recall Lenin's admonition to "read the opposition." The only people who don't have to plan for the future are those who don't care.

I would select as my text for a sermon on planning, the following quotation from John Gardner:

> Sometimes institutions are simply the sum of the historical accidents that have happened to them. Like the sand dunes in the desert, they are shaped by influences but not by purposes. Or, to put the matter more accurately, like our sprawling and ugly metropolitan centers they are the unintended consequences of millions of fragmented purposes.

This, it seems to me, offers us a clue as to the real meaning of planning, and the light in which we ought to regard future change. We are seeking to do more than anticipate the directions in which we are to be pushed or blown; we are seeking to identify the winds of change in order properly to set our sails—to *use* this motive power for established purposes. And when you get right down to it, the whole object of planning—the highest object at least—is to identify and to clarify purpose. What we do when we plan wisely is to assess and to reassess the values we seek to serve, and the ends we seek to gain. Only secondarily, do we plan the means and methods by which these are to be achieved.

Viewed in this light, planning is not a modern thing at all, but a contemporary restatement of the ancient adage, "know thyself." Our strong institutions have always tried to do this, though un-self-consciously. (This may come as a surprise to them; like Moliere's M. Jourdain, who was astonished to discover that all his life he had been speaking prose.) And any planning effort that loses sight of this cardinal object is destined to be an exercise in futility.

Now most of us think we know ourselves. Our confidence in this view is usually shaken only when we encounter some unanticipated set of circumstances—a new set of stresses and strains that calls attention to a lack of self-understanding. And this, of course, is precisely what our educational institutions can anticipate—and to a certain extent already have experienced—in an era of rapid change: stresses and strains that open up and reveal gaps in self-understanding.

Much of our ignorance of ourselves and our values and purposes stems from our unwillingness to conduct any meaningful self-assessment. And planning can be thought of as just such an exercise: as attending to (again in Mr. Gardner's words) "the goals we ought to be thinking about and never do, —the facts we don't like to face and the questions we lack the courage to ask." This is planning in its noblest form.

An important secondary function of planning lies, as I have said, in an effort to capture the winds of change in a fashion that will serve the goals and values of an institution. There will always be a number of institutions that will sail downwind. But the institution that has a clear sense of its objectives will use the winds and the tides in a fashion that helps get it where it wants to be. It will cut, sew, trim and deploy its sails to this end.

It is this secondary strategic and tactical dimension of planning that is the object of greatest attention these days. And a variety of techniques and devices (and experts in their use) have been assembled to assist in the process. But it is well to remember that these are the sailmakers, the compasses, and the weather forecasters. They can make your sailing easy only if you don't care where you're going. More positively, they can help you get where you know you want to go. But they can no more help an institution find purpose than could Ahab's quadrant help him find Moby Dick. And without purpose, the instruments of planning are like Ahab's quadrant, "foolish toys" and "babied playthings of Admirals."

And the greatest single danger in educational planning is that it will lose sight of its purpose of clarifying objectives, and be suffocated by considerations of strategy and tactics.

The second greatest danger of planning is that it will result in a plan. Now, that's not quite as silly as it sounds. For there is something about "*a* plan" that is truly ominous, a quality that is somehow compounded when it becomes a "master plan." That something that is dangerous about a plan is composed of a number of elements which include at least the following:

a) a tendency to rigidify the course of progress of an institution;

b) a tendency to impart a specious quality of certainty, order and serenity to the life of an institution; and

c) a subtle pressure to conformity, or alternatively, a loss of spontaneity in the life of an institution.

The plan, in short, can become a conservative, even stultifying influence upon a university. It can be railroad tracks laid across a meadow meant for meandering. It can become a device behind which small men hide in an effort to protect themselves against threatening innovation. Every bright new idea can be dismissed as an expensive change order, and leadership can relax the eternal vigilance that is the price of vitality as well as of liberty.

Please don't misunderstand me. I'm realistic enough to know that plans are an inevitable product of planning, and that those plans are frequently useful, sometimes even necessary. In attempting to impart to the public, for instance, some sense of the purpose of an institution (and some order-of-magnitude estimate of the cost of commitment to that purpose!) a tangible plan is almost indispensable. And yet I choose to accentuate the dangers of "the plan" precisely because they are less obvious than its practical uses and values.

And I place this emphasis as I do because I believe that what institutions most need as a result of planning is not a plan, so much as it is

a) a clear set of goals

b) a sense of strategy and spirit in the institution's approach to these goals

c) resources with which to monitor its activities, including especially, sufficiently strong and sensitive leadership to ensure that goals remain the litmus of every action.

A positive view of planning, as I see it, is that it is one of a number of efforts essential to the integrity and the vitality of an institution. It can serve the function that Charles Kettering attributed to research when he called it "an organized method for keeping you reasonably dissatisfied with what you have." I would call it, in terms suited to our profession, a required course in thinking. It ought to be a constant, restless kind of self-analysis. It must not only never end; it must not even pause to rest.

The virtue of recent efforts to encourage institutional planning lies largely in the fact that it leads to *organized* planning efforts. Planning becomes more than what the President does while shaving. It becomes built in, institutionalized. At best, it becomes around-the-clock sonar, a distant early warning system, if you will, but a system.

Now, herein lies another danger. As it becomes institutionalized, it becomes professionalized, and from there it's a short step to being separated from the main stream of institutional life. It is absolutely essential that planning not be delegated to some separate or detachable agency within—or without—an institution. Heaven help the institution whose president *stops* planning while he shaves. For if, as I have tried to suggest, planning is a process of relating practice to goals, it must be part of the daily life of an institution's leaders, and *vice versa.*

A principal purpose of planning is to ensure that an institution retains a degree of control over its own destiny. And institutions of higher education are, today, in danger of surrendering that control to internal forces and external forces, and even to combinations thereof. Internally, we are in danger of falling victim to creeping ad-hocism, if you will. In our desire to accommodate the wishes of individual members of our several communities of scholars, we are in danger of conceding that an institution is no more than the sum of its parts. We are likely to try to do all things for everybody, thus becoming "the unintended consequences of millions of fragmented purposes." Externally, we are in danger of being "systemized," or forced into a master scheme of some sort, state or regional, or even national. It is as though educational conscription had been enacted—frequently in the name of economy and efficiency—under which each institution is expected to don the same drab uniform and accept willingly its assigned duties in the table of educational organization.

Both of these forces—centrifugal and centripetal—exist in our educational world. And it should be regarded as a function of planning, that it help an individual institution steer between this Scylla and that Charybdis. In dealing with our internal relationships we may properly take the position that the institution must stand for *more* than the sum of its parts—that there must be common purpose as well as individual purpose; and in our relationships with other institutions, we can take as our motto the words of Robert Frost: "The separateness of the parts is at least as important as the connection of the parts."

And all this prompts me to raise another important question: "Who are to be the planners of American higher education?" It is an important question because the power to plan, no less than the power to tax, is the power to destroy. And it is the power to create and to elevate as well.

Now I can't tell you in the abstract who *ought* to be doing the planning; but I can tell you that if you can identify the planners, you have identified the leaders.

And this simple test affords considerable insight into the changes that are taking place in our educational community. The fact that much planning for colleges and universities is going on outside those institutions may only reflect a lack of planning *within* the institutions, but it does suggest also the danger that these institutions may have surrendered control of their own destinies.

You won't be surprised to learn that I think of the *institution* as the basic agency or unit for planning; and that state and regional plans ought to be built out of this stuff, rather than out of a more abstract notion of what constitutes the tidy or the economical in higher education. It is important to say at the same time that our institutions are not sealed private compartments in our society. They do not—cannot—plan in splendid isolation. Some will derive their goals from a sense of involvement in an historic tradition; others will take their cue from contemporary forces. But their planning efforts will in no instance be totally the product of private, internal inspiration. And yet, without responsibility for planning, they are without control of their destinies, and they are no more entitled to be called institutions than is a local post office. It is quite possible that within the next decade, the colleges and universities of this country are going to be sorted into two piles; those that are truly institutions, and those that are branch offices of some bureaucratized social welfare agency—or if you prefer, wholly-owned subsidiaries of some vast, absentee corporation. And no institution will preserve its standing in the former category unless it plans in a manner that is meaningful.

Now in conclusion, let me say that it is proper, I think, to ask this question: With our future as a society so uncertain, so subject to rapid and dramatic change, what right have we to presume to plan for it? The answer, I believe, lies in the simple fact of our own instinct to try to pierce the veil of the future. If we don't plan for it, we are certainly its victims. And as we sense a future of turbulent change, it is absolutely incumbent upon us to train our most powerful intellectual searchlights out ahead.

And yet, I am satisfied that we must be resigned to an imperfect perception of the future. We must acknowledge that in going out to meet an unknown future, the most careful battle plan may be rendered obsolete over night. And thus, I would urge upon all institutions my own conviction that our strongest ally in our foray against the future is not a plan, but a resolute sense of values; values that will (among other things) attract and hold leaders of courage and imagination, and inspire and rally academic communities to common cause.

And I should like to add an improbable and personal footnote. Our planning for the future can appropriately include a scrutiny of our past. And in support of this aspect of planning, I would cite the words of Carl Becker on the value of the study of history in general: "Its value . . . is, indeed, not scientific, but moral; by liberalizing the mind, by deepening the sympathies, by fortifying the will, it enables us to control, not society, but ourselves—a much more important thing; it prepares us to live more humanely in the present and to meet rather than foretell the future."

Selections from the Discussion

The only assurance for the future of the institution lies in emphasizing the qualities that are distinctive, such as the fact that some were brought into being to accommodate the sons and daughters of the industrial classes. These are characteristics of the values that ought to be represented in the values of the institution today. The rich diversity that we often allude to has become a meaningful thing. Everybody seems to strive to imitate some kind of universal model. If our institutions are worth preserving, there ought to be something inside them that shows through in their practices, policies.

I was trying to suggest the possibility that unplanned institutions will soon find themselves in the role of sub-parts of other components of a larger organization which may or may not reflect the current problems and objectives.

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I think of education as being more than a function of social welfare.

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State-wide coordination fills a void. The assistance of state-wide coordination may be an indication of a failure to plan.

One of the great strengths of WICHE is that it has tried to encourage individual institutions to plan for themselves.

So far as a coordinating council encourages individual institutions to regain control and to clarify their sense of purpose, it is performing a useful function; insofar as it removes from the individual institution responsibility for planning, we deprive our educational system of its great motivating force.

I don't know why each college cannot have a say in its own future. If planning is imposed on all of them, that is the end of the system.

I agree that the master plan was an effort to clarify the purposes of institutions. I don't know the extent to which the institutions participated in that clarification.

There are going to be a lot of individuals who don't relish the change. The function of an educational institution is not simply to prepare somebody to adapt himself to these changes. Its purpose is to introduce young people to values that are not only educational but will persist in our contemporary society. I don't see how an institution can resist the impact of change. Human beings are not different from those 5,000 years ago.

The people in the institution should be very much involved in the planning, but they should be planning with a common purpose in mind. I did not mean that the whole institution should not be included in the planning. I believe in the institution as the basic unit. An educational institution is likely to outlive the individuals who happen to guide its destinies at any given moment. Its purpose should be to promote and preserve values and not just as a matter of convenience for individuals who bind together for a short time.

We have a committee on university planning—alumni body, board of trustees, president of the university. . . . Our office of institutional research meets for one-half day every week. It is a fairly vigorous effort. We are trying to understand better why we have been important in the life of the state trying to translate for the 21st century. We are not very scientific but very stimulating. Those of us who have participated in the process understand ourselves and our institutions better, are more likely to subscribe to a common course for the institution.

I don't think legislators are well qualified to plan. They are qualified to pass judgment. There may be some legislators that are in a position to plan. This ought to be a function of educators.

I understand why planning agencies have come into being. I think it reflects a weakness on the part of our institutions. I would urge real planning on the part of the institution. Legislators rush in to fill voids.

This comparability of data is important to a relatively small group of people. Its value for state planning is limited. It may help a coordinating council.

I am convinced that a great many more four year colleges have to come into being. I think there are a great many institutions that aspire to be universities. Where there is purpose, however, I have no reservations at all about junior colleges becoming four year colleges, four year colleges becoming universities.

Our principal failure as public institutions has been our failure to distinguish between need and demand . . . misinterpret possible demand as a real need of society. There is some need to re-evaluate our historic inclination to do whatever was asked of us . . . try to do something that is really needed. What we do will be reflected by the needs of contemporary society.

Show me the planners and I will show you the leaders. I think a college president should be a leader. He ought to be responsible for planning. Such staff as is assembled ought to become part of the office of president. The highest purpose of planning is to achieve consistently the purposes of the institution . . . I don't know how a president can better spend his time.

Why don't you regard planning as a dynamic thing? I think this is very important to the vigor and vitality of an institution. You can let someone come in and decide it for you. The extent to which you delegate pieces or parts of this function of planning, to that extent you are in danger of losing control of the destiny of the institution.

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Planning in the College or University

Dean E. McHenry, Chancellor
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In determining the scope of my talk, I have looked through the list of topics to be covered in the course of this conference and have undertaken to avoid undue duplication of the work of those who come on the program after me. What I have to say also is delimited, of course, by my own experience and inexperience. During the 1950's I served as director of higher educational surveys in Nevada and in the Kansas City area. I also was a member of the Master Plan Survey team in California during 1959-60. Although no doubt I shall be tempted to comment on statewide or metropolitan-area-wide planning, I will try to leave that to others because my topic reads "Planning *In* the College or University."

Within the college or university, however, many kinds of planning are needed: academic, physical, financial, and others. I propose to confine myself primarily to academic planning, but before getting into it I would like to say a few words about other types of internal planning.

Physical planning provides, to a considerable extent, the spatial framework within which an institutional program must operate. At our peril we forget Winston Churchill's comment in connection with remodeling the House of Commons: "First we mold our buildings, and then they mold us." Much instructional inefficiency is attributable to buildings that are poorly designed for teaching. College after college, for example, has too many middle-sized classrooms that get filled up with inefficient lecture sections of 30 or 40 students and not enough large lecture halls with good amenities for the best lecturers and an insufficient number of the seminar rooms needed for close instruction.

Financial planning, beyond the current annual or biennial budget period, is still relatively rare. A realistic fiscal plan can do much to convince educational units and those who man them to adjust their levels of expectations to reasonable estimates of fiscal prospects.

Turning now to internal academic planning of the college or university, I have the opportunity to speak to you on one of my favorite subjects. As Assistant to the President of the University of California, 1958-60, and as University Dean of Academic Planning, 1960-63, I had the opportunity to participate in the formulation of both the academic plan for the statewide University system and the academic plans for each of the nine campuses. Indeed, my internal planning experience is so wholly limited to the University of California, that I fear my remarks may be excessively parochial.

Academic planning is a statement of internal educational policy and a statement of the means and schedule of implementation of that policy. Effective planning requires the achievement of a substantial consensus among those who make the rules and those who are to carry them into execution.

At the outset, the college or university properly should take as "given" the pertinent provisions of the charter of the institution and the mission there defined. It should also take under consideration other obligations imposed by tradition and long usage.

Next, it is well to review the division of labor that has developed over the years between the several institutions of higher learning in the state or area. If there has been a statewide or regional survey, one takes into account the functions and responsibilities indicated for the colleges and universities covered.

Having reviewed the basic purposes, and the inter-institutional setting, the next major task is to inventory one's own college or university and the public it serves. What is the institution doing now? How well is it performing its various tasks? Here we encounter one of the most difficult problems in the quest for certainty. On the research front, results are often tangible, particularly in the natural and applied sciences. The number and gross amount of NSF, NIH and other grants may be duly totalled up. Some large institutions, with research emphases, count their members of the National Academy the way the old lady in the one-act play counted her medals. Service activities, although difficult to evaluate, generate public responses that are often reassuring.

But it is in their foremost function—instruction—that colleges and universities find measurement of results the most elusive. Many of the more definite criteria are affected by admission policies and self-selection. Graduate Record examination results, baccalaureate origins of doctorates, Woodrow Wilson Fellowship awards, and other honors may reflect not only achievement but also superior selection at entrance. On the graduate level, standing among arts and sciences departments may be traced to the Educational Survey of the University of Pennsylvania, but one must remember that rankings were made by chairmen of departments whose human frailties might include affection for their own alma mater and regional bias.

The form and contents of an academic plan should be tailored to the needs of a particular institution or system.

Obviously, plans should be in writing. But they should not, I think, be printed and bound in too formal a format. A looseleaf compilation is preferable, and it should be marked "confidential" and "for discussion only." The factors on which a plan must be based—population, fiscal conditions, community and state needs, etc.—are in constant flux. Consequently, the academic plan ought not to be regarded as fixed, even for the five or ten or fifteen years which it covers. It ought to be adopted "in principle" only, as a guide to future action, but subject to adaptation to meet the changing conditions.

The plan is a statement of realistic aspirations. Aspirations can be ascertained by a simple questionnaire to departments, institutes, schools, and colleges. Realism, if absent, can be inserted by review and consultation. The various campuses of the University of California have followed different procedures in developing academic plans, but they usually involve formulation under the direction of a committee composed of administrative officers and faculty leaders. At Berkeley, where the first satisfactory plan was evolved between 1954 and 1957, this body was the Chancellor's Academic Advisory Committee, which was appointed—significantly—after the physical planning authorities asked for academic information on which to base physical plans. On the statewide level of the University of California, academic plans both of particular campuses and of the total University are reviewed by the President's Cabinet (composed of senior statewide officers), the Council of Chief Campus Officers (composed of the Chancellors of the campuses), and the Committee on Education Policy of the Academic Senate—all prior to submission to the Regents.

Our experience indicates that a statement of broad institutional objectives should be formulated and agreed upon at an early stage.

Student enrollment prospects also require initial attention. Institutions vary widely in availability of sound projections. In California we are fortunate in having an able statistical unit in the State Department of Finance, which has developed techniques of forecasting student enrollments with surprising accuracy. It uses grade progression ratios, following a child from birth, to elementary school, to high school, and then to college. With proper historical statistics, accurate data on births and rates of inmigration, projections of 15 years ahead are quite feasible. These were made for all segments of higher education in California's Master Plan. Within the University of California we subsequently made estimates of enrollment by campus and level of student for 40 years ahead, to the year 2000. This was done by assuming a constant relationship between University enrollments and state population, and using median projections of population growth. After that, in cooperation with the state statistician, we worked out further details on student "mix" and distribution among the various campuses.

Among the assumptions that must underlie an academic plan are those on admissions. If past entrance requirements are retained, this task is relatively simple. If, as happened under the California Master Plan, admission standards are changed and students are diverted to institutions or segments other than those of their first choice, then modified projections and elaborate recalculations are required. Changes in retention policies also can have considerable impact on the quantity and quality of the student body.

Any limitations on overall size or internal quotas should be stated. The University of California has adopted enrollment limits of 27,500 students for Berkeley, UCLA, and the three new campuses; 15,000 for Davis and Santa Barbara; and 10,000 for Riverside. Master Plan agreements call for a gradual reduction in the proportion of lower division to the total undergraduate enrollments.

Reasonable expectations should be stated for each existing academic unit, but the determination of "reasonableness" is a difficult task. Each estimate of growth should be related to trends of the past and should be in keeping with trends in comparable institutions in other sections of the country. An example of unreasonableness: on one campus, a department with 4.0 FTE faculty and 9.8 FTE graduate students, proposed to grow by 1967 to 10.0 FTE faculty and 55.0 FTE graduate students. Yet in the field of study fewer than 20 Ph.D.'s were produced in the whole country in an average year during the last decade. Administrative and faculty review must be used to cut such over-estimates down to size.

Each instructional unit should show projected students load in appropriate terms, such as FTE by level of student or by level of instruction. Staffing needs ought to be expressed in FTE and rank. In cooperation with fiscal staff, operating budget needs should be computed in present-day dollars. In cooperation with physical planning staff, space needs in useable square feet and capital outlay costs on a given index should be projected. After trial balances are taken, the requirements of the proposing units can be scaled down to fit the measure of fiscal feasibility.

Special studies may be required of library expansion. In California we use "*Restudy* standards," which, although not very scientifically determined, in practice provide a satisfactory goal. For the University campuses, they call for 100 volumes per FTE student for the first 10,000 students, plus 75 per student for the next 10,000, plus 50 per student above 20,000. Thus a campus of 27,500 students might lay claim to a library of 2,125,000 volumes. More than this can be justified, I believe, for great regional libraries such as those at Berkeley and UCLA, but I doubt whether we can provide for the larger new campuses on this scale. Obviously, campuses specializing in humanities and social sciences will need larger collections than those concentrating largely on natural sciences and technology. Before huge research collections are duplicated in library after library, every promising avenue of mutual use and interchange should be explored. In the California setting, we think it may make sense to operate a daily jitney bus among the campuses of Northern and Southern California, carrying readers to the large libraries and interlibrary loan books to the smaller campuses.

Professional schools pose special problems that may need separate studies from time to time. For the statewide academic plan we had committees at work on law, medicine, architecture and planning, and engineering; lesser staff studies were made of agriculture, business administration, paramedical and other fields. In the studies of professions, the supply and demand situation is canvassed as fully as possible. If new professional schools are deemed justifiable, their location by region or campus will be recommended.

Student-faculty ratios inevitably must be taken into account in the formulation of an academic plan. Ratios almost invariably are crude in that they make no allowance for the lower or higher level of student or for instruction involved or for the volume of non-teaching service rendered. The California state colleges, for years, have been held by the State Department of Finance to an elaborate staffing formula based on numbers of students and types of classes. The University of California is moving toward a standard ratio of about 16 to 1 FTE full-time faculty members, which might be as low as 12 to 1 FTE teaching staff members, including teaching assistants and other part-time staff. We are approaching agreement on a weighted ratio that assigns differential factors for lower division, pre-masters graduate, and second stage doctoral graduate students.

If desirable or necessary for existing colleges and universities, academic planning is indispensable for new institutions. At the new campuses of the University of California—San Diego, Irvine, and Santa Cruz—we started with provisional plans that will require elaboration later. Each plan states general assumptions and goals of the campus, sketches administrative organization, indicates anticipated professional schools and research specialties, defines library expectations, indicates teaching methods, projects teaching staff and otherwise attempts to forecast its future.

In the book of Proverbs it is said "where there is no vision, the people perish." Our experience is that unless colleges and universities plan ahead they are likely to encounter formidable obstacles, which they will deserve. Although the art of academic planning is in its infancy, it is the *sine qua non* for orderly growth in higher education.

Selections from the Discussion

Some institutions are certainly non-elite, like urban institutions . . . they do more than those of us who have students pretty carefully selected and come from the so-called best high schools and the best families and best economic status.

◆

We're trying to work out a way in which staying within the 16-1 ratio we can have students in close instructional situations for at least part of their stay with us.

◆

I don't think we have a standard teaching load. We've always tried to avoid it.

We have a very strong requirement of creative activity, and it isn't fair, particularly to young people, to load them up with so much teaching that they can't possibly do the work.

◆

I don't know how one could put this in an academic plan but I think in administering research funds within an institution, it is quite possible to make the assumption that most of the people in the physical and biological sciences will be pretty well taken care of through funds that are available from national sources.

Students take only three courses instead of five, on a quarter basis. Each student attends three quarters, and to the extent that it's financially possible, one of these courses will be a seminar or some other form of quite close instruction and the others are going to have to be fairly large lectures in order to pay for this on a 16-1 ratio, unless you're going to put the faculty in the classroom far more than it ought to be. We think we can work it out so that the teaching load is approximately two courses to an instructor—these would be five quarter units, and that the student load is three quarters—15 quarter hours—but with this kind of close instruction I think we can do a better job of appraising some of these more subjective factors that are not measurable on any test I know.

◆

It's more typical nowadays for people to teach eight or nine hours.

◆

We hope to involve the faculty in informal consultations, guidance and other things that probably should be credited to the teaching load in a very big institution.

◆

Among the heaviest teaching loads in the world are those of dons at Oxford and Cambridge. An organic chemist at Oxford runs about 21 hours ... I don't know of a junior college in California that would require that much classroom time of its teachers.

◆

The capacity of the schools that we proposed is based on some assessment of the status of the profession. In medicine it is extremely complicated. It has been worked on a good deal since the master plan within the University of California and by the Coordinating Council for Higher Education. We have had three or four reports of considerable interest and importance. Here we again go back to the desirable ratio in consultation with the profession, between the doctor, the practitioner and the population and again it's something very close to that for lawyers.

◆

From whence they come is a factor in law which I failed to mention: migration into the state is a very great factor in California—in getting enough professional people, but in medicine the migration is a good deal freer than in law because of the distance of national boards and various other things.

◆

There probably has to be a relationship worked out within a campus in the sizes of the graduate components.

The big factor in the difference between law and medicine is this very large import of medical people from out-of-state which has produced well over half of California's new practitioners for decades.

◆

Our physical plans for each campus are called "The Long Range Development Plan" and we have an approved physical plan, a plan of the campus and general circulation plotted out, location of buildings, etc.

◆

It is very important to know how many graduate students you are going to have.

◆

These are decisions that ought to be made quite deliberately—they ought not to be allowed to just grow like Topsy and then looked at to say "Well, see what happened." The trend ought to be watched, and if it's necessary to close down in a given area, this can be done by letting the building fall behind in this area, and the overcrowding itself will drive some away, or it can be done quite deliberately by increasing in the graduate level the selectivity of the graduate students.

◆

There are on the books in some states laws that require certain things about admission—I think this is unfortunate in many instances—but the whole matter of student admission has been dealt with in the State of California in public institutions largely institutionally or segmentally. The University has a state-wide standard for undergraduate admission which applies to every campus and the state colleges have a state-wide standard of admissions which applies to all of the state colleges. We have in California, as you know, an open door policy in the junior colleges, and I think it's proper that one of the segments should have such a policy providing the equivalent of the first two years of a four year college and transferring the students to the intended institution. They also perform the terminal function which is fine because it provides a short career and occasional opportunity for employment that does not require more than two years of preparation beyond high school. This is provided in state laws and I think it's appropriate that it is and I hope that we'll always keep the open door for graduates of our high schools.

◆

Virtually all that we do requires some public appropriation. We're dependent upon the appropriating body for approval of such segments of our academic planning that are being implemented in the budgetary period.

With regard to the role of the legislature on the academic plan, the master plan for higher education which was a most segmental approach (independent institutions, junior colleges, state colleges and the University of California) we were heavily dependent upon action by the state, and we had the job of acquainting legislators with some of the recommendations that required implementation by legislative action, though I think that out of the 70 or so, perhaps 50 of them could be implemented just by cooperation of the segments themselves. But we do require constitutional amendments to establish the board of trustees of the state colleges and to extend their term beyond the regular four years.

◆

I think the legislature should not be compulsive about an academic plan, but one never closes his eyes to the fact that the implementation of it will be heavily dependent upon state appropriations.

◆

Growth is a good thing in our society—I think uncontrolled growth might be malignant, even though it looks pretty good. At any rate, you may end up with a slight case of elephantiasis. It's a question, I think, of balance, of inter-relationship. If you want an institute of technology instead of a well-balanced university, then you let engineering and the sciences flow and you have a small department of humanities . . . but if you want balance, you don't want to be caught completely off base. For example, engineering is not so popular with high school graduates and if you go with the national defense policies that let things go up and down you get a lot of wasteful construction, and you get a lot of faculty members with tenure you don't know how to use after the fad is over. I'm not saying that any recognized discipline is a fad, but I think there is an obligation to get a balance and not to let a regional interest, for example, blow all your graduate programs out of shape. The larger number of students tend to draw more money and you tend to accentuate the trend by pouring in more money. Then you have the classics and other fields that don't get any NSF grants and don't get very much external support, and perhaps your institutional money ought to pay some attention to these neglected departments that don't show this tendency to growth but probably ought to if you're going to have real balance.

◆

It is hardly fair for a large and complicated campus such as the Berkeley campus to be budgeted just on numbers. So many students there are graduate students and such a high proportion of the graduate students are second stage doctoral, at the very most expensive part of their training, so some allowance must be made.

I like to have a university library that's got what you want or at least knows where it is.

◆

The ongoing responsibility for academic planning will be in the hands of an officer we hope someday to have who will be called assistant chancellor of institutional studies and this agency will probably have jurisdiction not only over planning generally but also over academic personnel. Of course, this is a team work job—there will be a vice-chancellor for academic affairs deeply involved. Much of our planning will be planning college by college.

◆

I can't imagine a student of poetry doing a very precise study on a micro card or micro film or some other mode of presentation. The departure from convention . . . is much more applicable in the sciences than in the humanities.

◆

We're proposing not to have a card catalog at all in the formal old-fashioned sense but instead to have a punch card story which will resemble somewhat these old ledgers which were often out of alphabetical order and in different hand writings over the centuries.

◆

I think in any institution that consultation is necessary; the extent of the consultation would depend I suppose on how much muscle the faculty had got in internal affairs and I think that in most administration-dominated institutions in the country, the faculties have at least certain powers of sabotage.

◆

Some of them were technically faculty representatives and some of them were technically administrative representatives, but they all were used to working together. The faculty must originate a lot of these things—they have to come from departmental or school or college faculty and they need to be reviewed all the way along—in our setting usually by the committee on educational policy. The state-wide academic plan was put together by some of us representing the administration—you remember we also have faculty status—and I think at that time all of us who participated were actively teaching as well and representatives of the state-wide committee on educational planning. We just spent weekends together, hammering things out—you write this piece and I'll write this piece and we'll come back together at 8 o'clock. It was a great effort and I think a good academic plan is a joint effort; somebody may have to take responsibility for final editing but this cooperation is essential to a successful plan.

We have simply examined the experience of Dartmouth and the large number of institutions (Occidental is one of them in California) that have adopted the three-for-three plan and we think, particularly reviewing the Dartmouth experience, that this has been quite successful. We think that the present indication of student interest is a serious problem; that the student is studying too many different subjects—jumping around on some campuses from one to two unit courses—I remember finding students carrying at one time seven different courses and still not carrying an overload. It's amazing that you find as many one and two unit courses as you have in the program. A student who is so diffused is getting just a smattering when he might get a good deal more. Personally, I think that going all the way to the Hiram College plan now . . . studying only one subject at a time perhaps makes for a certain amount of dullness and discouragement on the part of the student who has to take a subject he doesn't like very well. The Dartmouth experience and our own experience with proliferation indicates that the student's interest ought to be centered more than it is.

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We're going to make reading and writing a part of other courses.

◆

We hope not to talk in terms of three minutes of this and five minutes of this, etc.—we talk instead of "I'm taking a course, or three courses," or "I have accumulated over the course of the year nine courses" instead of x hours—when we're using a time strip for transfer, we will put a table of equivalencies down so that people can figure out who's qualified by such and such an average if they want to—we're going to try to move away from super consciousness of grade point average. I think we can put all the requirements into this pattern. Some institutions that use the course, Harvard for example, end up by having quite a few double courses and half courses which brings us back almost to the grade point. We hope to operate on the basis of reciprocity with all recognized four year colleges. If you've met the requirements for any campus in your first two years, you've met our requirements. One college of letters and sciences on one campus will say two semesters of English; another says two semesters of English or public speaking; and somebody else says one semester of each. We think the only sensible way is to say that there are many roads to heaven and if anybody has met the requirements in any junior college of the state or any campus of the University of California we're just going to say "That's fine." Come on in junior standing, no limitations. Now that's a lot easier to say than it is to implement.

For a four term quarter operation, we've been figuring on about 40% enrollment—which is good. I think it's as good as Pittsburgh has gotten, but it is not as good as we would like to have, but we have to budget on some basis. We think there will be various ways of dangling the carrot in front of the donkey, and one of them would be for new students, if they agree to come in the summer quarter, to be assured of housing in the fall quarter. I'm sure we'll come to the point where we'll get a pretty good enrollment and therefore better utilization than the 40% we implied. At Santa Cruz we've been thinking in terms of a specialized fourth quarter concentrating pretty heavily in the initial years on foreign languages. We have the armed forces language institute in Monterey which is probably the largest and one of the best language schools in the country, if not the world, and we think we can offer quite a wide range of languages, some of them fairly exotic ones—quick training in the language in the summer quarter in which a student might come out of eleven weeks of intensive work using our language school methods with a language he actually can use. If it could be done very quickly and with expert teachers . . . drill masters—who are natives of the country, we think that the language could be learned and relationships could be carried out in the language, and also we think that the results would be as good as they are at Monterey in the 11-12 week courses; then I think they would probably be better than we exact from our students in colleges of letters and sciences . . . four semesters of language or the equivalent.

◆

I remember the experience I had in my first period of teaching where the English Department requisitioned examination papers in any one of the social sciences and gave the grade from those exams. I've never had such well written final exams.

◆

How can we make financial plans and how can we build buildings without knowing what we're going to do academically? Planning ought to be a top concern of the academic administrator because planning is laying a sound foundation well beyond our own time and I think it's the job of the regents and trustees to probe and push and cajole until a proper plan be brought in. They will have some suggestions about academic specialties and this and that but if our experience is any criterion, I would say that a good board will not interfere. They will say, "Are you really planning for enough?" The board's job is to ask questions and to push for proper plans.

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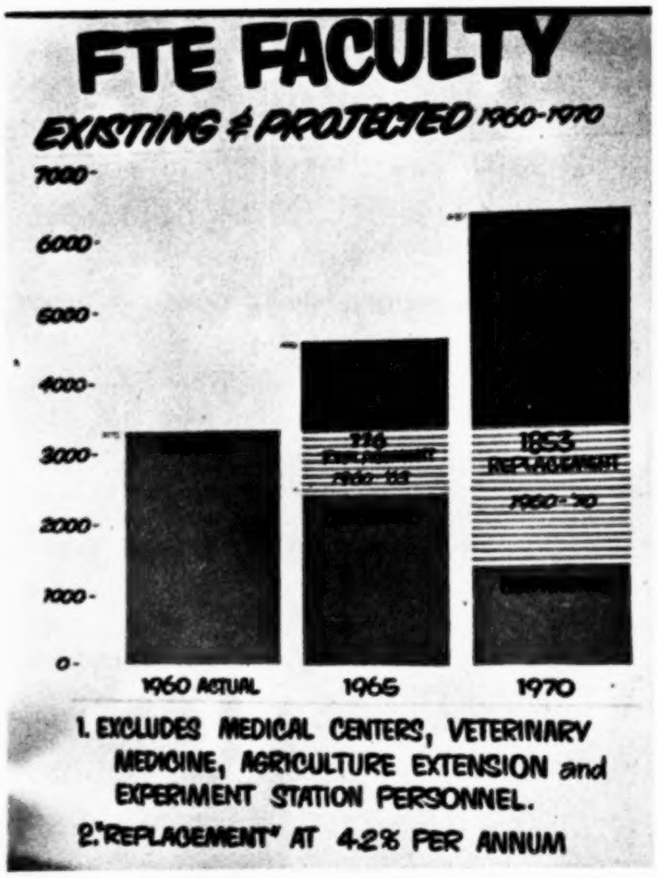
FTE FACULTY
EXISTING & PROJECTED 1960-1970
7000-
6000-
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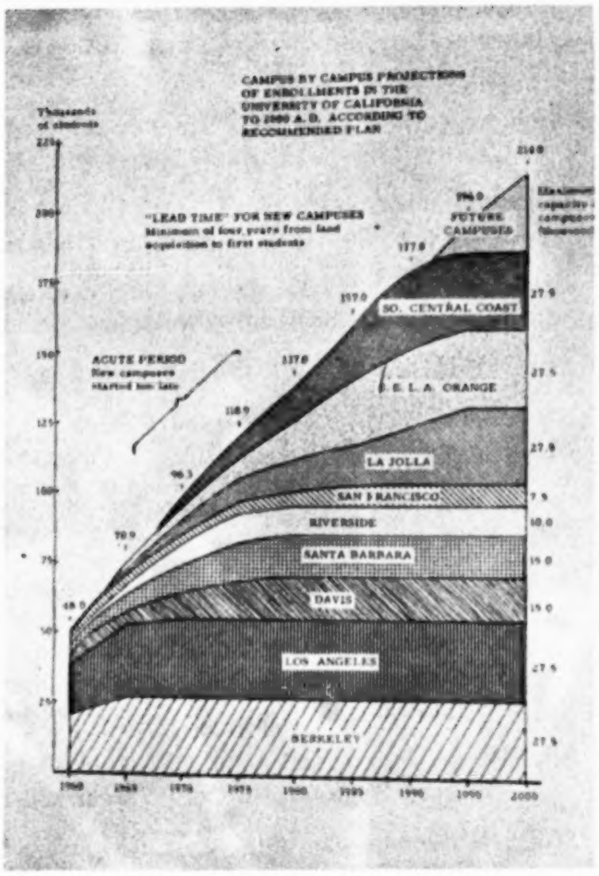
776 REPLACEMENT 1960-65
1853 REPLACEMENT 1960-70
1960 ACTUAL
1965
1970
1. EXCLUDES MEDICAL CENTERS, VETERINARY MEDICINE, AGRICULTURE EXTENSION and EXPERIMENT STATION PERSONNEL.
2."REPLACEMENT" AT 4.2% PER ANNUM


CAMPUS BY CAMPUS PROJECTIONS OF ENROLLMENTS IN THE UNIVERSITY OF CALIFORNIA TO 2000 A.D. ACCORDING TO RECOMMENDED PLAN
Thousands of students
225
200
175
150
125
100
75
50
25
"LEAD TIME" FOR NEW CAMPUSES
Minimum of four years from land acquisition to first students
ACUTE PERIOD
New campuses started too late
48.0
70.9
96.3
118.9
137.0
157.0
177.0
196.0
216.0
FUTURE CAMPUSES
SO. CENTRAL COAST
S.E. L.A. ORANGE
LA JOLLA
SAN FRANCISCO
RIVERSIDE
SANTA BARBARA
DAVIS
LOS ANGELES
BERKELEY
27.5
27.5
27.8
7.5
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1995
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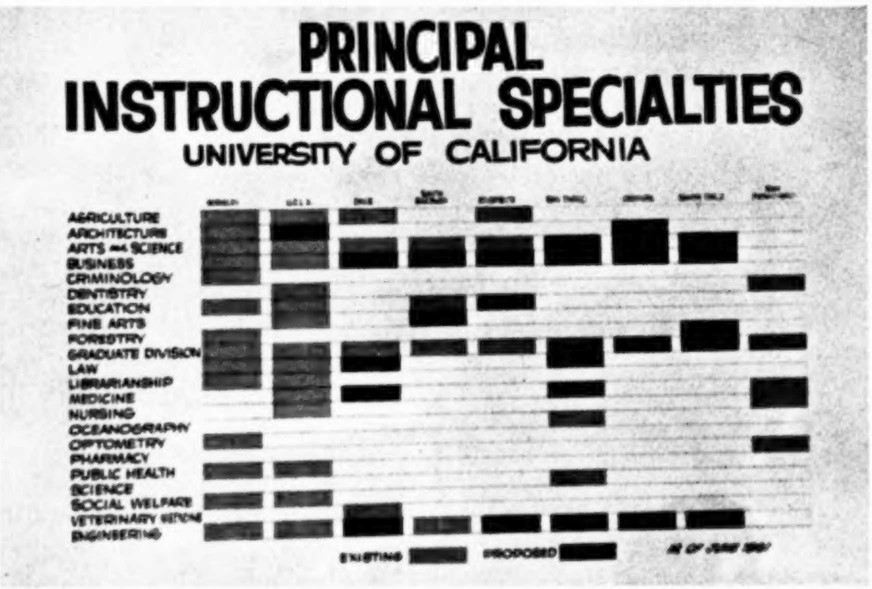
PRINCIPAL INSTRUCTIONAL SPECIALTIES
UNIVERSITY OF CALIFORNIA
AGRICULTURE
ARCHITECTURE
ARTS and SCIENCE
BUSINESS
CRIMINOLOGY
DENTISTRY
EDUCATION
FINE ARTS
FORESTRY
GRADUATE DIVISION
LAW
LIBRARIANSHIP
MEDICINE
NURSING
OCEANOGRAPHY
OPTOMETRY
PHARMACY
PUBLIC HEALTH
SCIENCE
SOCIAL WELFARE
VETERINARY MEDICINE
ENGINEERING
EXISTING
PROPOSED
AS OF JUNE 1961

A Case Study in Institutional Planning

The Master Plan of Southern Methodist University

Jesse E. Hobson, Vice President
Southern Methodist University

It is a truism that growth—including orderly growth—means change. Ordinarily this means a continuous process, but every so often, in certain organisms and in certain organizations, it involves discontinuities—quantum steps of growth. Southern Methodist University is experiencing just such a step as it begins to put in motion its Master Plan adopted in spring, 1963. As the cicada at a certain stage of development leaves behind a tenuous sheath which served indispensably in its past and bears the image of the organism it served, so SMU, looking to fall, 1964, enters a new phase of its growth, leaving behind relatively small but previously useful vestiges of its institutional life.

The plan is not offered as an inflexible format; rather it is a viable program with adaptability to future needs. Publius has stated, "It is a bad plan that admits of no modification."

The development of the plan amid ferment and expectation and its early beginnings in a setting of misgiving and assurance have provided moments of both anxiety and excitement for its designers. As they approach the future with a basic confidence in the plan's merit, it is hoped this spirit will infuse the reader as he learns of the plan itself.

I. Background

Southern Methodist University was founded in Dallas in 1911 by a special educational commission of the Methodist Episcopal Church, South. It is still owned by the Methodists of the eight-state (Texas, Arkansas, Louisiana, Oklahoma, New Mexico, Kansas, Missouri, Nebraska) South Central Jurisdiction of what since 1939 has been the unified Methodist Church. Its trustees are laymen and clergy elected from the Methodist conferences of these states although its actual Governing Board is composed of Methodists and non-Methodists, Trustees and non-Trustees. SMU was founded after Vanderbilt University broke away from the church; the new university was to be the major Methodist center of higher education west of the Mississippi River. But while denominational, SMU has never been "sectarian." Its faculty and student body have always represented various faiths. SMU from the first understood that its mandate from the church was to become the best possible free private *university*, and the Methodist tradition, itself free of dogmatism, has encouraged SMU's development in this direction. SMU has had few of the problems of delimiting doctrine, etc., that have plagued many other church-affiliated colleges and universities.

A Dallas family contributed a 300-acre campus half of which had to be sold off during hard times of the '20's and '30's; Dallas citizens provided money for the first building, Dallas Hall, pictured on our seal, emblematic of the tie between university and city, and still the home of the liberal arts; and as a small one-building school surrounded by fields of high Johnson grass and six miles from the center of a Dallas of less than 100,000 population, SMU began classes in 1915 with a College of Arts and Sciences and a Theology School.

Its first president was a physicist, Robert Stewart Hyer, who came from the Methodists' other "university" in Texas, Southwestern at Georgetown. Hyer had high aims and standards. He assembled an unusually good faculty of 36, many of whom later made their marks in scholarship or as college presidents, deans and professors elsewhere but many of whom stayed at SMU through their careers and the last of whom retired from SMU just a few years before the master plan was undertaken. The new university had an enrollment of 706, largest to that time of any beginning college or university; the need of the city, church and region for a private university was evident from the start. Among the students were Umphrey Lee, later SMU's fourth president, and many others who have meant much to its growth and progress. President Hyer adopted the motto *Veritas Liberabit Vos* —which has always had real meaning here—and took for SMU's colors, symbolically, the blue of Yale and the crimson of Harvard. He established the still-consistent pattern of neo-Georgian architecture, modeled on Jefferson's architecture at the University of Virginia. He at once established a strong liberal arts and sciences base and tradition. SMU was founded with, and has attempted to follow, high intentions.

In the '20's and '30's SMU developed in context with the times and the needs and interests of its city and region. Professional schools were added—Commerce (now Business Administration), Music, Engineering, and Law. "Big-time" football was introduced, and took SMU to the Rose and Cotton Bowls and the beginning of a national reputation in the thirties. With money tight, the university just held its own in these years, under the administrations of Hiram A. Boaz and Charles C. Selecman, both later bishops of the church. The march to greater academic scope and competence came in earnest with the appointment in 1939 of Dr. Umphrey Lee, then dean of the School of Religion at Vanderbilt and author-scholar as well as discerning administrator. President Lee served through the war years and the post-war boom in enrollment (up to more than 8,000 students in the late forties) until his retirement to the chancellorship in 1954. These years saw SMU win one of the three chapters of Phi Beta Kappa in Texas; SMU built more than half of its 70 major permanent buildings just after the Second World War, in a construction boom unparalleled by any other private university; if it left SMU "building-poor" it also provided a sound physical plant which left the way clear for an emphasis on "people and programs" in the master plan of the '60's. SMU's unusual annual "sustentation" fund drive in Dallas was begun in 1939 on a small scale; with local civic leaders heading it, it has always been successful and for some years has provided SMU more than half a million dollars to its actual operating budget.

Willis Tate, alumnus, former dean of students, and vice president for public relations and development of SMU, became SMU's fifth president in 1954. Advancement in gift income, of physical facilities, and quality and scope of academic programs has continued at an accelerated pace during the ten years of President Tate's administration.

The following gains occurred between 1954 and 1961, the year of master planning:

SMU's very meager endowment (a special study by the board of higher education of the Methodist Church showed that the endowment, for the scope and quality of SMU's program, should have been at least 60 million dollars in 1960) more than doubled during this period, from six to 14 million dollars. To offset this inadequate endowment, tuition was raised three times during this period (it was raised again this spring to a level of $500 a semester). Gifts from sustentation and other sources reached an annual level of from one and one-half to two million dollars. After the post World War II veterans' enrollment boom, enrollment leveled off in the '50's to an average 5,000 on-campus students. It increased only slightly between 1954 and 1961, from about 5,200 to about 6,000. The major increase occurred at the graduate level, with students taking work leading to the master's degree.

In 1957 SMU pioneered in the Southwest with a program of selective admissions using, with other criteria, the College Board aptitude test scores. At the time Rice Institute was the only other university in Texas using College Board scores; however, this trend has been followed so that now their use is almost universal among public and private institutions in Texas. Also in 1957, a powerful computing center was added to SMU facilities. Later a science information center was constructed and occupied in fall, 1961. This has become a regional source of scientific and technical information for both education and industry. The Graduate Research Center, Inc., was established in 1957 with the aim of supporting the development of advanced level graduate research and instruction up to the Ph.D. GRC, Inc. still exists as an arm of SMU for this purpose, and it also served as the nucleus for the development of Dr. Lloyd V. Berkner's Graduate Research Center of the Southwest, described later, which emphasizes post-doctoral scientific investigation.

Construction of academic buildings, including a new home for the School of Business Administration; of laboratory facilities, including the computing center and facilities in mechanical and nuclear engineering; and of dormitories continued during this time. A new student center and a coliseum for basketball and other sports also were built.

Attention was focused during this time on other SMU academic facilities such as the herbarium (largest in the South and Southwest) and a seismological laboratory, a member of the world seismic net.

In 1954, the Ford Foundation granted SMU $900,000 as the university which had done the most among Texas institutions to improve faculty salary levels. Also in 1954 the curriculum of the College of Arts and Sciences was entirely revamped.

1959 emphasized a project to build a first-rate Fine Arts Center. This has become an eight million dollar project. Construction is now underway on the first buildings of the Center, and a School of the Arts has been formed this year under the direction of the master plan.

The trend during the years under Dr. Tate has been toward increased emphasis on graduate study and research, based upon a strengthening of SMU's traditional liberal arts and sciences core.

A brief review of progress and development during the decade 1954-1964 may be of interest at this point. Enrollment has gone up and down slightly, leveling out at a fairly stable 6,000 on-campus enrollment in the last two or three years for a total increase of not quite 1,000 on-campus students in the period. At the same time, the enrollment of downtown Dallas College (which offers mostly part-time courses, some credit and some non-credit) has shown a decrease for regular credit courses from 3,000 to 2,450. The quality of students admitted to the University has steadily improved under the policy of selective admission based on College Entrance Examination Board scores as well as on high school rank and record. Average scores for the CEEB verbal test for 1963 were 512 for males and 530 for females, and mathematics scores were 561 for males and 508 for females. Retention of students has improved somewhat, primarily because of the acceptance of better qualified students; but retention remains a major problem and was the subject of a major study in connection with the planning process. The University granted 966 degrees in 1955 and 1,219 degrees in 1963. Of these, total undergraduate degrees (including those in humanities and sciences, business, engineering, and music) grew from 667 to 807. Graduate and graduate professional degrees awarded in 1955 were 326 and increased to 427 in 1963.

Faculty size and competence have increased in the decade. Faculty salaries have increased somewhat but are still far from adequate. The average salary for full professor in 1954 was $6,855 and in 1963 was $9,737, while assistant professor salaries went from $4,316 to $6,999. The full-time faculty roster increased from 200 in 1954 to 261 in 1963.

Although all financial indices of the University have increased significantly during the ten years, they have permitted the University to keep barely abreast of current needs. The net worth of the University increased from $29 million to $60 million, and investment in plant from $18 million to $35 million. As already pointed out, endowment increased during the decade from $6.5 million to $15.2 million and is, of course, far from adequate, being one of the weakest links in the chain of aspiration. Total gifts and contributions increased steadily year by year from $873,000 in 1954 to a total of $2,381,500 in 1963. The overall income budget has more than doubled in ten years from $4.5 million in 1954 to $10 million in 1963 and to a projected $11.7 million in 1964. Of this total for 1964, $3,153,000 is for instruction, not quite 30 per cent of the total budget, and is to be compared to a total tuition income of $5,250,000. During the ten-year period, tuition was increased three times to an annual level of $800 plus fees in 1963 and $1,000 plus fees in 1964. Scholarship and loan assistance to students necessarily increased as tuition increased—from a 1954 level of $172,000 to $585,000 in 1963.

The first Ph.D. program was initiated in 1959 in the field of economics. This program produced its first graduate—SMU's and the Dallas area's first Ph.D. degree—in 1963. Two more doctoral degrees were awarded in 1964, and twenty-one students are now in this doctoral program. Ph.D. programs in geosciences (with the necessary and excellent cooperation of the outstanding staff and faculty of the Graduate Research Center of the Southwest) and in mechanical engineering were begun in September 1963. It has been a decade of great progress, necessary to the development of the University but still insufficint to meet its aspirations and its obligations to the community.

II. The Situation—1961

As SMU entered its year of master planning, expectations for SMU to become a true and full-fledged university were high and rising among its faculty, administration, students and alumni in the Dallas community and in the southwestern region. By this time, SMU had very definitely developed in its corporate mind an image of itself as the best hope for becoming a major private university of full balance and quality in the Southwest. It no longer compared itself only with the other private universities in Texas, but also with the leading national private universities in other parts of the country. It was also mindful of the great and growing need for such a major private university in Dallas and in the southwestern region, sorely lacking such institutions. The leadership and citizenry of Dallas were increasing financial support, no longer just because SMU was "Dallas' University" and furnished football entertainment, but because of their growing awareness of the centrality of a dynamic university as the social, cultural, and economic bulwark for the future of the city. SMU had made many contributions to the life and progress of the city, having sometimes geared programs of its professional schools to specific community needs and having provided a rich program of adult education and community services of the sort usually undertaken only by public universities. Many eyes were now on SMU, and the question posed to the university during its master planning effort was, "Is SMU ready, willing, and able to become a university of the quality and scope needed to fulfill its own destiny and to meet the needs of the city and region?" Our later discussion of the master plan itself will show how SMU decided to answer this challenging query with integrity.

In 1961, SMU had about 6,000 on-campus students. About 60 per cent came from Texas and the remainder from every other state and from some 40 foreign countries. SMU had a full and part-time faculty of about 300, about two-thirds of whom were highly qualified and held doctoral degrees. The University had been able to attract numbers of bright young scholar-teachers from the best graduate schools as well as growing numbers of qualified students; but their expectations were high, and many of the best young faculty members were using SMU merely as a stepping stone to better universities. Further, lack of ability to retain the best-qualified students was somewhat alarming. Although alumni interest and support had risen, most alumni seemed to have a confused image of their alma mater, and their financial support was not and is not yet what it should be. The general public in Dallas and in Texas was divided on the idea of what SMU was and was trying to be and do; some thought that SMU was trying to be a "Harvard of the Southwest" and was "getting too big for its britches," while others still saw SMU as a football-social school of not much real academic substance. The master plan, if for no other purpose except to serve as a vehicle for clarification and definition of the university and its goals, was urgently necessary for all these groups.

A definition of purpose and objective was also needed by the church at this point, because the church had some fear that SMU was getting ready to follow the history of so many other major private universities which had drifted away from an original church sponsorship and affiliation. On the other hand, many local leaders of business and industry and also foundations and other sources of support, regarded SMU's church affiliation with some misgiving. This issue was tackled head-on in the master plan.

Among the various motivations toward the development of a master plan as an urgently needed blueprint, a predominant concern was that of community need and expectation. 1961 found SMU imbedded as a symbol of higher education and as a necessary service to the community in a progressive, expanding southwestern metropolitan region which had great ambitions and expectations in the process of rapid transition from the agricultural-oil economy of previous decades to an economy necessarily based and with increasing dependence on new technology. The population of metropolitan Dallas was about 1,150,000, and of metropolitan Ft. Worth about 585,000, with a population for the entire metropolitan region (essentially one economic unit) of roughly 1,750,000. SMU as a private institution in Dallas and TCU as a private institution of similar size, quality and development (but without a School of Engineering) in Ft. Worth joined with North Texas State University and the state-supported Texas Woman's University, both in Denton, 40 miles from Dallas and Ft. Worth, and with recently accredited Arlington State College (a branch of Texas A & M University) in Arlington, mid-way between Ft. Worth and Dallas, to form the primary advanced educational and research resources of the region. The University of Dallas, a Catholic institution supported by the diocese, had been recently organized but not yet accredited and had only a few hundred students. Bishop College had recently moved from Marshall, Texas, to Dallas to provide education for qualified negroes. The outstanding quality of the University of Texas Southwestern School of Medicine in Dallas certainly was not to be ignored, although its field of research and higher education was limited to medical science. It is highly significant that not one earned Ph.D. degree had been granted in this metropolitan region of 1,750,000 persons in 1961.

The Dallas-Fort Worth region seemed to illustrate a coexistence of C. P. Snow's two cultures but with twentieth-century science represented by sophisticated, technologically-based post-war industries rather than by the academic community. Texas Instruments, Ling-Temco-Vought, Collins Radio, General Dynamics, Bell Helicopter, and other companies were expanding rapidly, in the aggregate were employing thousands of engineers, had thoroughly competent and creative research organizations, but were quite discouraged and unhappy with the amount and quality of graduate-level education available in the region. The dichotomy between this progressive, virile, new industrial segment and the rest of the community, including the institutions of higher learning, was one neither of intent nor choice. There had been a lack of understanding by both civic and academic leadership of the real nature of the new science-oriented industry and its growing appetite (and, indeed, starvation) for advanced training and research environment in the sciences, engineering and technology. The awareness of a handful of civic leaders, guided by the vision of Mr. Erik Jonsson of Texas Instruments, to this important problem of community resources in higher education was demonstrated as early as 1957 and resulted in an organization, GRC, Inc., which eventually developed into the Graduate Research Center of the Southwest. GRCSW was chartered in 1961 as a non-profit, academic organization established to foster basic research at the post-doctoral level in the most advanced areas of scientific exploration, to bring to the region a community of outstanding scientific scholars, and to act as a stimulus to the growth of scientific and engineering graduate education in the region. Many community leaders would state now that if SMU's engineering school and its science departments had been, even as late as 1961, all that a program of excellence demanded, GRCSW would not have come into existence. All of the universities at first tended to regard GRCSW as a competitve threat for funds, for community interest and for support, and they were not sure that GRCSW could contribute in a substantial way to their individual programs of development. One must hasten to add that GRCSW has now aptly demonstrated that its faculty may well become indispensable to the assistance of developing graduate programs in the region, yet conversely many are of the frank opinion that GRCSW cannot exist in post-doctoral, grant-supported research without the close cooperation of the universities and without a supply of good graduate students. Under the vital and inspired leadership of Dr. Lloyd V. Berkner, President of GRCSW, and Erik Jonsson, its board chairman, the community has become well informed regarding the necessity for superior resources in higher education and research, although the initial emphasis may have been slanted too much toward science and engineering without proper parallel emphasis on the social sciences, the humanities, and the arts.

Work on the master plan thus began with a background of lost opportunity in the industrial community and rather severe disappointment on the part of its major companies and with a close inter-relationship with a new, very advanced and thoroughly competent basic research organization, the Graduate Research Center of the Southwest, housed temporarily on the SMU campus. GRCSW had stated firmly its policy not to grant degrees, a policy which brought considerable reassurance to the universities. The extent and intensity of the community ferment for graduate level education and research in the sciences and technology was indicated in the spring of 1963 by a very successful fund-raising campaign for GRCSW which netted pledges of $5 million from local sources in six weeks—the largest amount of money ever raised in Dallas by campaign for a single purpose in that amount of time. Community eagerness for an outstanding university was also demonstrated by intensive activity of the educational committee of the Chamber of Commerce which conducted a thorough survey of local requirements for holders of B.S., M.S., and Ph.D. degrees in engineering and science in the years to 1970 and of the need for advanced educational opportunities for engineers and scientists already employed in local industry. The results of this survey were startling, revealing that some 1800 Ph.D's in engineering and science would be needed before 1970 over and above 2,000 M.S. and 23,000 B.S. degrees.

The university administration and several members of its board knew in 1961 that the university must take a major step forward to meet its community responsibilities for professional education in engineering, science and business management as well as to meet community expectations for leadership in the fine arts and in teacher training. It was recognized that SMU's response to the community's needs, particularly in engineering, in the sciences and in business, would be the basic yardstick by which the community would measure the progress and success of the university. Preoccupation of the local press with science and technology, emphasis on advanced scientific training by the Chamber of Commerce and GRCSW's growing scientific importance all made such a conclusion inevitable.

During the decade, SMU's School of Law had been solidly established under the leadership of outstanding deans as one of the best schools in the South. At least equal progress toward excellence had been established in the Perkins School of Theology which in 1961 ranked as one of the three or four outstanding theological schools in the United States. Definitely lacking in quality and strength were the Arts College, the School of Enginering and the School of Business. Fine Arts, with the exception of a reasonably good School of Music, also had failed to meet community expectations.

Definite assets of the institution were its firm and almost unique emphasis on academic freedom (an environment exceedingly difficult to achieve and maintain in Dallas but an environment forged by President Tate with the full support of the Board of Trustees); the deep respect, high regard and personal affection for the president; the loyalty of the community to SMU as "its own" institution; a strong community conviction to private enterprise and private institutions; the very good reputation SMU enjoyed nationally; and a few truly outstanding scholars on its staff. Major weaknesses were low faculty morale; rather weak internal leadership and administration; growing lack of confidence from business and industry that SMU would or could meet their needs in engineering, science, technology and business; a rather low student morale which probably resulted primarily from attitudes of the faculty; and dangerously inadequate financial resources to move the university forward progressively.

III. Reasons for the Master Plan

In 1961 SMU faced the realization that a total planning process was both necessary and urgent, and that the undertaking called for a major redefinition of objectives. The reasons were these: President Tate, key community leaders, the trustees, the administration, and the faculty realized that while SMU had developed rather dynamically according to some loosely-defined theme and plan, it could not continue to grow and develop like Topsy, but *must* have an overarching blueprint, with guidelines for its academic future. The president's advisors realized that SMU was perhaps five to ten years late in developing such a master plan. They saw that in many respects SMU had been a leader and a pacemaker among southwestern universities, especially private institutions, but that without a clear plan and a sense of priorities for the future, this leadership might be vitiated. Looking at the region, they saw signs of dynamic progress underway in neighboring public and private universities and knew that SMU, for its very survival, must exploit and develop its own particular strengths for SMU was, and is, very much in competition with state as well as privately supported institutions. They saw an inadequate endowment and felt the need for great increases in operating budgets; they further knew that this need must be precisely defined. They were mindful of the acute competition for qualified faculty and were aware that while SMU faculty salaries and benefits had risen steadily in the preceding decade, they were neither adequate nor equitable in terms of the current national picture. They knew that the prime question in the minds of those composing the university community and its friends and supporters was whether SMU was really going to become a first-class private university. They knew that time was short and that for SMU the only alternative to an exciting, comprehensive, and unified plan for the future which would attract major support was an inevitable process of dead-leveling mediocrity. They knew finally that while a master plan, in its deep psychoanalysis of present problems and needs, would have a disturbing effect upon the faculty and many supporters who would not agree with all of its decisions and priorities, the alternative would be a continuing decline in morale and a gradual but certain diminishing of faith in the destiny of SMU as a first-rank university.

IV. The Planning Process

The year 1962-63 has been aptly called "the winter of our discontent." Essential to the planning process was the establishment of structures and procedures through which members of the university's various parts could critically and openly examine every aspect of the university's life.

1. The President's Role

From the very beginning, the planning strategy began in the office of the president. When the plan for the university's entrance into its second half-century was finished and presented to the board of trustees, it came as the President's Plan. Between the beginning and the finished product, there was careful, deliberate openness and receptiveness on the part of the president; moreover, there was a sincere desire and effort to free every member of the university to study, examine, and speak on any and all aspects of the university's life. This openness on the part of the president continued far beyond a comfortable deadline for decisions and the final drafting of the plan.

2. Structure for Planning

Eighteen groups were established to facilitate the planning process. The first three groups, appointed by the president, were:

The Faculty Planning Committee. The president carefully and objectively surveyed his various faculties. He decided that he had an outstanding educational statesman-scholar possessing the kind of broad, deep, liberal education required to give leadership. This faculty member was asked to chair the important *Faculty Planning Committee* and to devote approximately one year to the planning project. Five additional faculty members were named to this committee. They represented the best minds from the various schools and from the College of Arts and Sciences. This committee was charged "to bring the best academic values from the university as it now exists and to provide scholarly leadership in the development of the Master Plan. They will set their own course in considering general and specific questions of their origination having to do with the type and kind of educational institution which SMU aspires to become."

Throughout its operation, this committee furnished an effective two-way channel of communication between faculty and administration. Its papers to the Steering Committee (described next) provided helpful guidelines for the emerging plan; and an early one, *Key Issues in SMU's Future,* was particularly valuable as a guide piece for the entire planning effort.

The Master Plan Steering Committee. This committee included the president, the provost, the dean of the College of Arts and Sciences, the research consultant to the president and coordinator of the Master Plan, the chairman of the Faculty Senate, and the chairman of the Faculty Planning Committee. The Steering Committee established the Office of the Master Plan with a staff, gave full direction to the planning process, and eventually created the Master Plan for SMU.

The Student Master Plan Committee. A group of ten students gave direction to student involvement in the planning process; sponsored retreats, forums, and discussions; and submitted a thirty-page report covering a wide variety of subjects of special concern to student leaders. Particular attention was given to the College of Arts and Sciences, its faculty, its curriculum, its facilities, and its relationship to the other schools of the University. No other group in the planning program gave more serious, objective and constructive consideration to SMU's major problems.

Other working groups included:

The Committee of Fifty. This important body was composed of friends of the university who were concerned with SMU's future and the future of private, liberal-arts-oriented colleges and universities. While a large percentage of the membership of the Committee of Fifty came from the Southwest, there was representation from both the East and West Coast and from the Midwest. Members were drawn from alumni and friends, from educators, from the church, from industry and the professions, and others whose general interest in higher education included a concern for a major private university in the Southwest. The committee met three times during the planning year at SMU. The second meeting was a two-day session, with sub-committees working on eight specific areas of SMU's life and mission.

The Council of Deans. This body held a two-fold responsibility in developing the master plan. First, each dean was responsible for assisting in and encouraging a "hard-nosed" review of his school, including an analysis of such considerations as present offerings, practices, goals, and types of students desired. This review was made by a task force from each school appointed by the president. Second, the council of deans was responsible for bringing its administrative judgment to the various proposals developed during the months when the master plan was being created. As the president stated, "The council of deans brings the accumulated experience and tradition of SMU, plus full awareness of present practical problems."

Campus Task Forces. The President, with the assistance of the Steering Committee, appointed nine campus task forces, composed largely of faculty members with some administrative personnel. The areas covered were: The School of Engineering, the School of Business Administration, the Fine Arts, Graduate Education, the College (one task force dealing with the College structure, another dealing with the question of faculty responsibility), Scholarships and Grants-in-Aid, Student Life, and University Admissions. The reports from these task forces, submitted to the Steering and Faculty Planning Committees, were immeasurably helpful as the master plan developed. (It should be noted that both the School of Law and the School of Theology had just completed eight to ten years of planning and development and were not involved in this detailed process.)

Consultants. One of the first steps taken in the development of the master plan was the selection of three senior consultants. These were retained for a year and came to the campus several times. They were visited by SMU officials at other times and gave continuing advice and counsel.

Visiting Committees. Four outside groups, related to arts, engineering, journalism and student life, were brought to SMU. These visiting committees counseled with the appropriate departments and schools at SMU and gave advice and guidance to the Master Plan Steering Committee.

3. The Procedure for Planning

The planning process moved through five main phases. The first task was selecting, inviting, and *securing the commitments* of approximately 150 people who would be working in the planning. The key committees, task forces and consultants were enlisted first; other groups followed.

The second step was the *defining of the roles* of the different planning groups. Groups were to work within the larger, already defined goal of the plan; namely, to chart the long-range future of SMU and to develop a specific plan for the next 7 or 8 years. The job of defining the roles of various working groups was accomplished at a retreat of about 25 leaders in early September, 1962, at which the senior consultants were present.

There followed an intensive week of *launching the planning process.* The senior consultants came to the campus for a week; meetings were held with a wide variety of groups; task forces met with the consultants; the "ferment" began. At the close of the week, the consultants joined the president in a meeting with the general faculty and assisted him in placing SMU's planning needs in the larger context of American higher education.

The fourth step can be described as *working, talking, listening, reading, writing.* Perhaps the "listening" took priority for the first few months.

During the Christmas holidays another retreat was held for the top leadership. This gathering was for the purpose of *assessing progress, further defining directions, and setting tentative deadlines.* The months of most intensive work were perhaps January through March, 1963.

Between the dates of late March and May 1, the first "bare bones and basic proposals" draft of the plan was completed; general faculty discussions were held; the final meeting of the Committee of Fifty, with trustees as guests, was held; revisions of the plan were considered, and the *final copy completed.*

4. Appraisal of the Planning Process

Although those promoting and guiding the development of the plan never wavered in their conviction of its need and its validity, they were deeply aware of certain problems and limitations to be faced during the planning process. The ones listed—the major ones—obviously were inter-related to some degree.

(1) The problem of lack of readiness on the part of many faculty members was soon evident. The number of good faculty members willing and capable of being involved in the planning process was limited. It was realized that it would become very difficult to secure the full cooperation of both faculty and administration in any kind of planning process which would by its very nature break up power structures and call for re-thinking of long-established practices. On the other hand, if a planning process were moved along without full cooperation, it would be inevitable that resentments would build up which would find expression later.

(2) Early in the year of planning, the inadequacy of the University's system of records, data gathering and processing became evident. This limitation continued and, unfortunately, still exists.

(3) The University perhaps tried to do too much in too short a time, yet there was certainly merit in doing this kind of task reasonably quickly. Faculties are not free to attain their best under such unsettling conditions as develop in a planning year.

(4) General morale continued to be a problem. While morale was unsatisfactory before planning began, it became steadily worse during the planning period. Only among the leaders in faculty and administration upon whom the future really depended was there a growing sense of hope about the future and a genuine commitment to what turned out to be an exciting and challenging experience.

(5) One of the major problems throughout the planning year was the knotty question, "Who approves the plan?" An honest reappraisal of who and what you are, on the part of any college or university, lays open to scrutiny the general quality of the faculty. As has been noted by a number of university and college presidents, reappraisal and planning for the future is seldom accomplished with

the unanimous consent of present faculties. SMU, no exception, therefore faced the problem of having to develop a plan which would, hopefully, represent the best current thinking in higher education—and yet face the prospect of having such a plan voted down by a majority of the faculty. To avoid this and yet to involve faculty, the following procedure was adopted by the president and the steering committee:

a. The plan was to be the President's Plan, submitted by him to the Trustees.

b. Those academic responsibilities traditionally belonging to school faculties were carefully reserved for the various faculties. This principle was so stated in the plan and was clearly enunciated at an early date.

c. Open discussions by the Faculty Planning Committee, by the various task forces, and by the president himself, were held throughout the year.

d. There was no vote scheduled for the general faculty to approve or disapprove the plan. This was recognized as a calculated risk.

e. The third meeting of the Committee of Fifty was a joint one with the trustees, who came for a full discussion of the plan and its progress. It should be noted that most of the members of the SMU Board of Governors and many of the trustees were members of working groups. Throughout the year, all the trustees were kept informed through various means of communication.

f. The plan was mailed to the trustees prior to their May 1963 meeting. After full discussion and with no objection, the plan was adopted unanimously and the President authorized to begin implementation immediately.

(6) Although it should not be cited as a problem, the creation of the University College became perhaps the most controversial and certainly the most dramatic feature of the plan. Conceived as the mechanism for providing the necessary basic liberal education of all SMU students, it was difficult for some to assess it as a concept without a specified curriculum. Yet the development of its curriculum had to be left to the general faculty, not all of whom were in any sense commited to the University College concept as stated in broad terms. Even during planning, the University College was dealt with in terms of goals and functions rather than such factors as organization, courses and work assignments. These specifics have since crystallized in large measure. Selections from the bulletin announcing the start of the University College for fall, 1964, is presented as Appendix B.

V. The Plan

Appendix A presents an outline and selected sections of *The Master Plan of SMU*—1963-1969 as adopted. The sections, *Theme of the Plan* and *The Idea of a University* of this appendix furnish a thorough exposition of the philosophic basis for the plan. In brief, this foundational concept says that the University must provide first the basic liberal studies and next the specialized professional courses in order that its graduates will possess wisdom as well as knowledge and will emerge as worthy human beings as well as specialists and professionals.

Following are six significant features of the plan. It is felt that the impact the plan has on the future course of the University will center around these points of emphasis.

1. Creation of the *University College* constitutes the major and most dramatic change in SMU's educational format. This College represents no fixed time period in the life of a student, but rather a *kind of education;* the College is charged with the responsibility for the *basic liberal education* of all undergraduate students. Appendix B, *The University College*, presents the rationale behind this new academic entity.

The University College has no faculty of its own, but draws from senior faculty members from the several schools of the university. It grants no degrees. Under the control of the general faculty of the entire university, it admits and enrolls all freshman. The college is administered by the Dean of the College and his University College Council which is elected by the entire faculty of the university.

The college is responsible for approximately 40 hours throughout the four years of an undergraduate's total studies, which, for example, in the School of Humanities and Sciences is 124 hours, plus Air Science or Physical Education. Students remain in the University College until they qualify for admission to one of the schools of the university (Humanities and Sciences, Business, Engineering, and the Arts). Ordinarily a student will qualify for admission to a school of the university at the end of his freshman or sophomore year, but admission may be obtained earlier or later depending on his qualifications, progress and ability. Each student will be given some work in the University College during each of his undergraduate years, so it is not a "lower college." Normally a student might spend 75 per cent to 85 per cent of his freshman year, 50 per cent to 75 per cent of his sophomore year, 25 per cent of his junior year and 15 per cent to 20 per cent of his senior year under University College instruction. Each student will progress as rapidly as his abilities and energies permit; honors programs are emphasized, and each student is under counseling from a senior faculty member of the school he expects to enter (although full opportunity will be given to change his educational objectives). As the program develops, some time will be allocated for individual creative work by the student under leadership of his counselor.

2. A prominent feature of the plan is a rapid movement toward an *enhanced graduate program* with its accompanying research activity, and commitment to excellence at the graduate level represents a major decision on the part of the plan's designers. From the standpoint of the community, particularly its technological segment, the emphasis on graduate studies and research is undoubtedly the plan's dominant feature.

Under the plan, a total of eight doctoral programs are projected by academic year 1969-1970. Five are already authorized: three, Economics, Mechanical Engineering, and Geophysics are underway; and two, Electrical Engineering and Religion, are scheduled to start in 1964-65. Although a considerable effort is underway to accelerate the attainment of Ph.D. programs of excellence, care is being exercised in the appointment of faculty and selection of students in order not to dilute course offerings or compromise scholarly standards. These aims and other vital factors affecting graduate excellence are being properly guided and monitored by joint committees responsible for the recommendations launching each new Ph.D. program.

In the plan, graduate education is now the responsibility of each of the six degree-granting schools, under the overall approval of a Graduate and Professional Council which represents all of the graduate faculties of the university. Each school will have its dean and also its director of graduate studies.

SMU is lending leadership and full cooperation to inter-institutional programs of graduate studies in the Dallas-Fort Worth region. Such cooperative programs not only permit a sharing of academic strengths but also avoid costly duplications in certain graduate areas, resulting in earlier achievement of the high goals set.

3. *The development of the faculty* is given top priority in the master plan. Not only was a salary schedule developed calling for a minimum of 50 per cent increase above present levels, but the number of the faculty is to be increased by 35 per cent by 1969. Attesting to the fact that SMU has already demonstrated good faith in the matter of faculty salaries since 1954 is the schedule of increases shown in Table II. Other phases of faculty development include: provision for study leaves, publication subsidies, more adequate faculty services, and other provisions for encouraging faculty self-improvement. Most important, however, is the emphasis upon a faculty recruitment program based on sound analysis of faculty needs in the developing program at SMU, both undergraduate and graduate.

4. The need for a *strengthening of administration* of the university was evident from the beginning of the planning process. The plan, accordingly, calls for annual appointment of department chairmen, the addition of a dean of academic services, a dean of student life, and an executive vice president.

5. High on the list of master plan priorities is a *concern for students*; the kind of students, the quality of student life, the need for a strengthened student counseling program, and for a marked increase in scholarship assistance.

6. *Funding requirements* for the master plan, in addition to present budget levels and projected revenues from increases in tuition levels and endowment income are outlined in Table III. These estimates are based on an increase in undergraduate enrollment of about 2,000, to a total of 6,000 in the fall of 1968, and an increase in graduate enrollment (full-time and part-time, including 115 resident pre-doctoral students) of 1,000 by the fall of 1968. A total of 6,000 undergraduates and 2,000 graduate and professional students (600 in the school of law, 400 in Perkins School of Theology, 115 in pre-doctoral work, and the remaining in the several master's degree programs) will use the physical plant and faculty at maximum efficiency.

The physical plant of the university is, fortunately, reasonably adequate and is a major existing asset of the university. The $10,000,000 planned for additional investment is apportioned as follows:

Completion of fine arts center	$3,500,000
New laboratories (primarily) engineering & science)	2,200,000
Remodeling of older buildings	3,000,000
Library facilities expansion	1,300,000
	$10,000,000

VI. The Year Since the Plan Was Adopted

The board of trustees, at its meeting on May 10, 1963, approved the plan as submitted by the president and instructed him to take all action necessary to implement the plan in the fall of 1964. The year following the board's adoption of the plan saw such action commence, slowly at first, and then proceed at a quickening tempo.

First, the resignations of all department chairmen were requested and obtained. New appointments were then made by the provost, with terms ranging from one to four years in order to afford an opportunity for a complete review of departmental leadership.

Further, the board of trustees straightaway approved a special "seed money" interim fund of $460,000 in addition to the regular budget to be used during the academic year 1963-1964 toward the implementation of the master plan. This seed money was for multi-fold purposes: to permit selective increases in faculty salaries in advance of major funding for the plan; to continue the planning process in greater detail; to make institutional planning a permanent part and function of the university; to provide a limited number of faculty fellowship leaves for study and research; to provide for a few senior faculty appointments; to develop a much-needed language laboratory; to provide a minimum of additional administrative assistants; and to make the necessary studies and preparations for funding of the master plan.

The response of the local press and the community itself to announcement of the plan was immediate, spontaneous, and enthusiastic. It was a reaction which underscored mounting evidence of the community's high expectations for SMU. There was generally solid endorsement of the plan's objectives, and thus a period of watchful waiting and renewed public interest in the university began.

The administration of the university expected to develop further the details of the plan during the summer of 1963, but actually only slight progress was made. Everyone in the planning process (including a large percentage of both faculty and staff) had been intensely preoccupied with the year's work which finally resulted in a plan better than most expected and enthusiastically endorsed by trustees, consultants, and community. A reaction was inevitable, and nearly everyone involved found it quite difficult, now that the plan was a reality, to give it constructive consideration. With the tension of creativity relieved, the plan's designers felt like "forgetting it all," and for a period of several weeks, did just that.

The university convened in the fall of 1963 with a new appreciation for the soundness of the plan and with renewed interest in its implementation. The plan began to look better and better as detailed decisions at all levels of the administration began to be made in accordance with the skeleton outline of the plan. It was a pleasant surprise to find deans and departmental chairmen, as well as administrative officers, following the plan and preparing to continue and extend the planning process in accordance with its objectives and policies, without reminders or requests from higher levels of administration. It became apparent that the plan had already achieved, without additional effort, one of its major objectives—that of setting a course for the entire university.

During the summer of 1963, a dean for the University College was employed, and the University College Council was elected and started planning curriculum and courses. The Office of Coordinated Planning was permanently established under the direction of a vice president with a small staff to continue the planning process, to guide the implementation of the plan and to organize institutional research.

A University Planning Council was established, with the Vice President for Coordinated Planning as chairman. The council consisted of all university officers (except the president), the council of deans, and elected representatives from the faculty. During the year, the council met at least once each month to consider matters it felt were of major and immediate importance to the university in carrying out the master plan and to fill in the structure of the master plan itself. During this period, the council called for and considered reports on student recruitment; graduate studies in the university; the university press; faculty developments; the instructional process in the university; systems, procedures and records within the university; the Graduate and Professional Council; and certain administrative procedures within the university.

A visiting committee to the School of Engineering was named, and two meetings of the committee were held to develop long-range strategies for strengthening the School of Engineering and for enlarging its services to the university and the region.

Studies were started to re-structure the Graduate Research Center, Inc., in order to strengthen its roles as the research office of the university and as a vehicle for support of graduate research. Further progress in the move toward a more viable graduate program came about with the establishing of new Ph.D. programs in geophysical sciences and mechanical engineering.

Other important steps were taken to strengthen the faculty. In addition to the appointment of the dean of the University College, new deans were appointed for the schools of Law, Humanities and Sciences, and Business. Recent appointments include a dean for the new School of the Arts, starting fall 1964, and a vice president responsible for student life and student affairs. Soon to be appointed is a new dean for the School of Engineering.

Major efforts were made during the year toward achieving the objectives of the master plan to cooperate with other colleges and universities of the region. A program was set in motion to provide graduate-level engineering instruction to the master's degree on the TCU campus in Fort Worth with the active assistance and cooperation of TCU faculty. Under this plan, SMU teaches all engineering courses, and TCU teaches the required mathematics and physics courses. Degrees will be awarded by SMU, but the diploma will recognize the cooperation of TCU. After two semesters of operation, this program has received enthusiastic endorsement from the TCU faculty, the SMU faculty, and from industry.

Early in 1964, SMU took the lead in organizing the Inter-University Council of the Dallas-Fort Worth metropolitan region. A charter was issued by the state of Texas to the new council, with SMU, TCU, the University of Texas Southwestern Medical School, Texas Woman's University, and North Texas State University as founding members. Later invited to membership were other colleges and universities of the region, including Arlington State College, Bishop College, University of Dallas, Texas Wesleyan University and the Graduate Research Center of the Southwest. Steps were initiated to develop long-range cooperative plans for graduate-level education and research within the entire region, involving all colleges and universities, both public and private. Specific areas of cooperation now being studied include libraries, the use of microwave links between institutions, central computer facilities, and instructional cooperation in graduate programs in certain fields. It is expected that a council office soon will be established at a central location with one or two professional staff members to develop its plans and programs. Reaction of the business communities in Dallas, Fort Worth and Denton was excellent to the announcement of this plan.

Within the framework of the Inter-University Council, aggressive steps are being taken to establish a Graduate Studies Consortium between SMU, TCU and the Graduate Research Center of the Southwest for more extensive cooperation in developing graduate programs of excellence at SMU and TCU, and for taking full advantage of the faculty and resources of GRCSW for doctoral and postdoctoral research.

During the year, a thorough review of funding estimates for the master plan was undertaken by senior officers of SMU. This review resulted in significant changes in the previous estimates of funds required for the five-year period from the fall of 1964 through the 1968-1969 academic year. Funds required to implement the master plan for that period (in addition to current levels of income from all sources, and also in addition to anticipated increased revenues from tuition) amount to $37,635,681. Table III shows the proposed allocation of these funds.

The firm of John Price Jones was retained to help the university prepare plans to meet the funding requirements. The chairman of the board of trustees, the president, the vice president for development, and the vice president for coordinated planning visited several universities during the year to discuss comparable development and funding programs. A special meeting of the board of trustees was held in March to review the funding estimates and to begin preparation of plans for meeting the funding goals. Studies are now being completed for launching the major funding program for the master plan.

It is evident to those concerned that very considerable progress has been made toward implementation of the master plan and toward the establishment of a new and dynamic direction for the university, but the university has not yet recovered completely from the traumatic shock of the planning process. There are still a number of skeptics and critics within the university family, and there are some who accept the plan with great reluctance. There is, however, a new spirit of confidence and optimism in the university as a whole and in the community, and it is of interest that this has occurred before definite steps were taken toward major funding of the plan and before any of the new funds were available. Not all of the "seed money" has yet been spent for its interim objectives. A balanced budget is scheduled for next year, with an increase in income from $10 to $11.7 million. Operations during the past year permitted a reduction of $250,000 in a previously-incurred operating deficit. A further reduction of $250,000 in this previous operating deficit is budgeted for next year. Tuition for the next academic year will increase from $800 to $1,000. The prospects for enrollment, both in quantity and quality, look better than at any time in the history of SMU.

Southern Methodist University will approach its fiftieth anniversary year (1965-1966) with promising and encouraging prospects for the future. There is real confidence that the master plan has made and will make a determining and important contribution to that future.

TABLE I

ENROLLMENT, SPRING SEMESTER, 1964

Comparative Enrollment Summary

Division	Spring 1963	Spring 1964	Change Number	Change Percent
Campus—Undergraduate	3494	3573	79	2.2
Graduate	735	901	166	22.5
Theology	321	309	—12	—3.8
Law	489	492	3	.6
Dallas College	1465	1608	143	9.7
TOTAL	6504	6883	379	5.8

Comparative Enrollment by Classification—Campus Undergraduate

Freshman	1153	1377	224	19.5
Sophomore	793	808	15	2.0
Pre-Junior	66	77	11	16.7
Junior	760	684	—76	—10.0
Senior	479	443	—36	—7.5
Specials	243	184	—59	—24.3
TOTAL	3494	3573	79	2.2

Comparative Distribution by Schools

Humanities & Sciences	2363	2481	118	4.9
Business Administration	476	439	—37	—7.8
Engineering	463	465	2	.1
Graduate	735	901	166	22.5
Theology	321	309	—12	—3.8
Music	192	188	—4	—2.1
Law	489	492	3	.6
Dallas College	1465	1608	143	9.7
TOTAL	6504	6883	379	5.8

Geographical Distribution

Countries Other Than The United States	88
States Other Than Texas	1293
Texas Counties Other Than Dallas	1555
Dallas	3947
TOTAL	6883

Thirty-six foreign countries and United States possessions are represented. Forty-seven states and the District of Columbia are represented. Alaska, Maine, and Rhode Island are the states from which we do not have students. One hundred and fifty-five of the two hundred and fifty-four counties are represented.

States, in addition to Texas, with large numbers of students are: Illinois (157), Missouri (107), Oklahoma (105), Louisiana (98), and Arkansas (77).

TABLE I (Continued)

Enrollment by Men and Women

Spring, 1964

	Men	Women	Total
Humanities and Science	1124	1357	2481
Business Administration	365	74	439
Engineering	340	2	342
Graduate	818	83	901
Theology	289	20	309
Music	67	121	188
Law	467	25	492
Dallas College	1197	411	1608
TOTAL	4667	2093	6760
RATIO:			
Undergraduate	56.5%	43.5%	
University	69.5%	30.5%	

TABLE II

AVERAGE FACULTY SALARIES—S.M.U.

	1954-'55	1963-'64	1964-'65
Instructor	$ 3,353	$ 5,322	$ 5,854
Assistant Professor	4,316	6,999	7,699
Associate Professor	5,264	7,873	8,660
Professor	6,855	9,737	10,711

TABLE III

MASTER PLAN FUNDING REQUIREMENTS

1964-'65 through 1968-'69

Endowment		$10,000,000
People and Programs:		
Faculty Development	$11,977,181	
Scholarly Publications	250,000	
Undergraduate Student Aid	1,150,000	
Graduate Ph.D. Programs	2,447,500	
Post-doctoral Research Fellowships	128,000	
Library	1,500,000	
School of the Arts	500,000	
Laboratory and Research Equipment	1,450,000	
Administration and Staff	2,100,000	
Plant Expense	1,500,000	
Business and Services	625,000	
Development and Funding Expense	1,400,000	
TOTAL		$25,027,681
Facilities and Physical Plant		10,000,000
TOTAL NEW FUNDING REQUIREMENTS		$45,027,681
(Above budget level for 1963-1964)		
Less *additional* income from tuition increases and increases in endowment income		$ 7,392,000
New Funds required in addition to tuition income, endowment income, normal sustentation income and other sources of normal income		$37,635,681

APPENDIX A

The Master Plan Outlined

The Master Plan which was presented by the President to the Board of Trustees on May 10, 1963, is a document of 72 pages, containing 36 major recommendations. Most of these recommendations contain several parts. All the recommendations are based on a central educational philosophy, which is articulated in the report and also in the superb separate final report of the Faculty Planning Committee, which will be published later. In order that interested alumni and friends of the University may understand the major recommendations of the Master Plan, and something of what each means, we here cover them in shortened form, with a running commentary on their implications for the future.

The Idea of This University

The Master Plan defines *a university* in these terms:

"By tradition and by logical definition, a university is a community of scholars, mature and fledgling, dedicated to the life of inquiry and the communication of knowledge. Such a community achieves its purposes in manifold ways but chiefly through the cultivation of human intelligence and judgment. Its common goal is the educated person, whose interests open out upon a wide range of human problems and values, whose tastes, habits and conscience are informed, critical, articulate, responsible."

Following are the seven major goals set forth for *this* University, consistent with the above statement and with SMU's founding purposes, historical development and tradition:

1. To be a university whose educational process and program are meaningful and valid and are committed absolutely to the highest academic integrity, quality and substance; a university whose institutional character is marked by a centrality of concern for the basic arts and sciences and by a balance, on the one hand, between the humanities, the social sciences and the sciences, and on the other hand, by a balance between undergraduate, professional and graduate education; and a university whose enterprise as a private, pacemaking institution continually proves of real benefit to its students, its city, the Southwestern region, the nation, and humanity.

2. The pursuit of truth and the preservation, dissemination, and extension of knowledge.

3. To educate men and women who can *think* and express their thinking with logic and effect; who *know* their own tradition in the perspective of other ages, ideas and values and who can understand the problems, issues and challenges of their society and time; who can *do* something of significance in and with their lives; and who realize the nature of *being* and are prepared to probe the ultimate questions of life and to relate their own humanity, sense of self, and deepest aspirations to those of others in a creative, constructive way.

4. To take full advantage of the University's relation to its sponsoring denomination, emphasizing especially the traditional concern of The Methodist Church for high quality non-sectarian education, together with its mandate that such education be open to the questions of man's ultimate concerns, his basic moral values, his spiritual needs and aspirations—and the relevance of the Judeo-Christian tradition as a resource for wisdom in human and humane existence.

5. To insist on an atmosphere and environment for learning in which freedom of inquiry, thought and expression is a *sine qua non*, in the belief that the valid is confirmed and the fallacious exposed by a free enterprise of ideas, and in the faith that truth so arrived at is indeed liberating to human individuals.

6. To create and maintain an unparalleled "community of concern" in which each student and faculty

member is valued as an individual; to cherish each student and to provide him in every way possible, inside and outside the classroom, library and laboratory, the fullest opportunity to develop intellectual, moral and social maturity and responsibility.

7. To serve society as a source of intellectual, cultural and spiritual energy; to do so through the regular educational offering and by community services such as adult and continuing education, special institutes and seminars, use of the University's talents and facilities by the community, and in other ways whenever these are consistent with the objectives and role of the University and the legitimate needs of society.

Admissions and Size

The primary criterion for admission to SMU will continue to be the applicant's capacity and motivation to perform creditably the academic work here.

A policy of university-wide minimum admissions standards for all baccalaureate students will be set.

SMU will strengthen its recruiting efforts to find, admit and retain better and better qualified students.

General admissions standards will continue to be raised as the source of available applicants is enlarged.

Whenever the undergraduate enrollment reaches 6,000, it will be limited to that number. Graduate enrollment will be set in the future at about 2,000 students.

By 1969, if there were 6,000 undergraduates, from 1,200 to 1,300 baccalaureate degrees would be awarded. The graduate number of 2,000, probably by 1969, would include about 600 in Law, 400 in Theology, 120 in doctoral work and the rest in the various master's degree programs.

The Life of Learning

Average faculty salaries will be raised by a minimum 50% above present levels—the present *average* faculty salary for the whole University is about $7,700—in the next five years.

The number of faculty members teaching in SMU will be increased by 35% in the next five years, including the addition of eminent scholar-teachers.

The annual *instructional* budget—mostly for faculty salaries—will be increased from the present $4 million to $8.5 million in the next five years.

Teaching loads will be reduced to give faculty time to be competent scholars and teachers.

More adequate faculty services and facilities will be provided.

An intensified academic counseling service will be established throughout the University beginning in the freshman year in the new University College. The counselors will be outstanding scholar-teachers.

The libraries of the University will be coordinated and strengthened.

The University College

The new University College is the structure which will implement the positive premise that basic education is the primary responsibility of the entire university to all its members. The University College will not offer a degree in any curriculum, but it will provide the structure in which:

—an academic counseling service will be established assisting every student prior to his admission to a degree-granting program.

—the basic liberal disciplines (with their appropriate faculties) will provide basic education requisite for the curricula of all Schools.

—interdisciplinary education requisite for all the curricula of all Schools will be provided.

The University College will begin operation in September 1964.

All beginning students will enter this College.

The entire faculty of the University will be the faculty of the University College.

There will be a Dean of the University College, and direction of this College will be the responsibility of the whole faculty, who will elect a University College Council of 15 members from all the Schools. This Council will be responsible for general admissions to the University College, curriculum of the College, correlation of the work of the College with the degree programs of the University, and working out teaching responsibilities in the College by drawing on superior knowledge and teaching ability of faculty members in any or all of the Schools. All courses in a given discipline will be taught by faculty in that discipline.

Academic advisors for the University College will be chosen from among professors of all the Schools. If a student shows early interest in any area of study, he will be assigned to an academic advisor in that field, whenever possible. A major strength of the new University College will be this system of academic counseling for each student, providing a sound orientation for the beginning student during his adjustment to college academic life and making it possible for each student to see the various rich opportunities for gaining knowledge and helping him to select from among a variety of major fields.

An honors program for exceptionally gifted students will begin in the University College, and this College will experiment with ways to provide opportunities for some independent study for all students.

Students from the University College will be admitted to the degree-granting Schools when they have completed the admissions requirements set by each School.

The School of Humanities and Sciences

The name of the College of Arts and Sciences has been changed to the "School of Humanities and Sciences."

This School will remain the home of the basic liberal disciplines. It will have two great challenges in the future: to bring the wealth of knowledge of the humanities, social sciences and sciences to *all* students, through cooperation with the University College, and to develop to the highest its own "major" disciplines in scholarship, teaching and research.

There will be continuing review, study and revitalization of the curriculum in the School of H & S, a program of independent study and advanced placement, and an honors program for gifted students.

The value of combining some of the present 27 departments in the School of H & S will be studied.

The department of Education will remain a department in the School of H & S, providing courses to meet the requirements of public school accrediting agencies for teachers, and each department is called upon to recognize its own responsibility for the education of teachers in the subject areas which they will later teach.

The department of Journalism will remain in the School of H & S. It will be strengthened by a new curriculum built on a base of liberal studies and by the addition of new faculty.

The School of Engineering

The School of Engineering, with both undergraduate and graduate programs, will be continued and vigorously strengthened.

The present co-operative program in engineering education will be continued, but on an optional basis and operated in-phase with the regular University schedule.

A program of undergraduate study on the regular University schedule (non-co-operative) will begin in September 1964.

Additional graduate programs will be developed in close association with local industry.

The Engineering faculty is asked to consider two types of doctoral programs: the Ph.D. degree oriented toward creative research, and some degree such as a Doctor of Engineering oriented toward the applications of science and technology with emphasis on economic and social objectives.

Programs will be undertaken to gain the support of local engineering-based industry and to lead to a better understanding of the educational needs for engineering in society.

The program to gain contracts and grants for research support from private industry, foundations and research-supporting agencies will be strengthened.

The School of Business Administration

The metropolitan area of Dallas is the center of a significant financial and commercial complex. There is a need for the education of business leaders with a combination of basic education in the liberal arts and sciences and professional training in the theory and practice of business administration.

The undergraduate School of Business Administration will be continued and vigorously strengthened. The faculty will revitalize and integrate the curriculum, including the reduction of vocational type courses.

A strong graduate program will be developed leading to a terminal Master of Business Administration degree.

The Arts

Knowledge and experience in the arts as a part of a student's liberal education, as well as professional training for some students in music, theater and the visual arts, have always been provided by SMU.

The University has had a School of Music and departments of Art, Music and of Speech and Theater in the College of Arts and Sciences. All of these programs in the future will be housed in beautiful new facilities of their own in the new Fine Arts Center.

In a highly technological age man is more than ever in need of contact with and inspiration from the works and processes of the performing and visual arts. SMU's program in the arts will be *educational* and of primary benefit to our students. But a fully developed campus center for the arts will also be of cultural benefit and stimulation to the Dallas community and the region.

The School of Music will be continued as an autonomous School for the present.

The present School of Music and the departments of Art and of Speech and Theater will evolve into a future "School of the Arts," with divisions of Music, Art, and Speech and Theater. The School of the Arts will be established some time in the next five years.

Immediate moves will be taken to strengthen the curricula, programs and faculty of Art and of Speech and Theatre, so that the School of the Arts may be constituted in the future with complementary strengths for providing both liberal and professional education in each of the three areas.

Programs in Music, Art and Drama for non-professional liberal arts students will be continued in the School of Humanities and Sciences after the creation of the professional School of the Arts.

Music as a future division in the School of the Arts will continue to offer the Bachelor and Master of Music degrees, and Art and Speech and Theater will award Bachelor and Master of Fine Arts degrees.

Dallas College

Dallas College will remain the unit of the University providing regular courses for undergraduates at irregular hours, or unusual courses not available in the daytime; courses for employed students who want to improve their education; courses for those who want to up-date their knowledge; courses for those who need to complete degree work at night or Saturdays; non-credit classes in vocational and cultural fields for local citizens; special short courses or institutes for business and professional groups; and other specialized educational activities and services, including certain vocational courses now found in the on-campus regular curriculum.

Registration for credit courses in Dallas College will be reserved to those judged capable of performing adequately in full consideration of SMU's admissions policy.

Careful study will be given to the establishment of a Center for Continuing Education, with facilities for resident conferences and institutes.

Graduate Studies

A major decision of the Master Plan is to continue to move into advanced graduate work and its accompanying research activity.

The present Graduate School structure has been changed to a "vertical" arrangement under which the graduate faculty of each of the six Schools will have responsibility to develop and to set standards and admissions requirements and curricula and degree requirements for their own graduate-research and graduate-professional degrees (Master's and Doctor's), subject to the approval of a university-wide Graduate and Professional Council of elected graduate faculty members.

The graduate faculty of the School of Humanities and Sciences will be constituted as the Graduate School of Humanities and Sciences, the only such graduate *school.* It will have its own dean.

In each of the other Schools—Engineering, Business Administration, Music (Arts), Law, and Theology—there will be a chairman of graduate studies, responsible to the dean of the School.

A Faculty of Doctoral Studies will be composed of all fulltime SMU professors who teach a graduate course in a field giving a Ph.D. or other doctorate. This Faculty will give advice, counsel and stimulation to present and developing doctoral programs.

In addition to the present Ph.D. programs in Economics and Mechanical Engineering, six other Ph.D. programs will be developed during the next five years.

SMU will participate in and give leadership to efforts for inter-institutional cooperation and coordination in the development of advanced studies and research in the North Texas region. This would avoid costly duplication in graduate programs between institutions in the region and allow inter-institutional use of faculties, libraries and laboratory facilities to strengthen specific developing graduate programs in each institution. Such inter-institutional cooperation should come about with equal emphasis upon advanced studies in the sciences and engineering *and* in the humanities, arts and social sciences.

The School of Law

The School of Law will continue to follow the direction set in the faculty's 1962 report of curriculum review and reform, continuation and improvement of graduate and comparative law studies, growth of the library, and improvement in the quality of beginning law students.

Perkins School of Theology

Perkins has been involved in the process of planning for the past ten years, and will continue its development according to the plan set by its faculty. The second major curriculum revision in 12 years was completed this spring.

Perkins School of Theology, in cooperation with the Graduate School of Humanities and Sciences, will work toward the realization of a graduate (Ph.D.) program in Religion.

It will strengthen its dialogue with and service to the Church through an expanded continuing theological education program for post-graduates.

Student Life

The program of student personnel services will be designed to support and to supplement positively and creatively the formal academic work of the University.

The program of student extra-curricular life will be designed to be increasingly the outgrowth of a process in which the student has played a vital part (e.g., through participation in student self-government).

The role of the student life staff is seen as *educational,* not merely problem-solving. It is to aid each student in reaching full maturity and to prepare him to take a useful place in society.

Each student will be given opportunity to mature morally, ethically and socially just as he is allowed freedom to mature intellectually.

The present Office of University Life is to be restructured so that there will be a Dean of Students, reporting to the President, a Dean of Men, a Dean of Women, an Associate Dean of Student Activities, and an Associate Dean of Special Services.

The Rev. William D. Swift has been named Dean of Men. Fred Bryson has been named Associate Dean of Student Activities and Director of the Student Center. Mack C. Adams has been named Associate Dean of Special Services, with responsibility for physical and fiscal affairs in student housing and the program of student loans. He will also administer the program of McFarlin Auditorium and the use of other facilities by non-University groups.

Responsibility for the administration of student discipline, for non-academic counseling, and for certain student programs, including fraternities and sororities and residence life, will be that of the Dean of Men and the Dean of Women. (Mrs. Ogden Baine is Dean of Women.)

Responsibility for a varied and stimulating program of student activities, including programs related to denominational and ecumenical movements, will be that of the Associate Dean of Student Activities.

(Dr. Mayne Longnecker is Dean of Students, in charge of the area of student life.)

The role and function of the University Chaplain, Dr. J. Claude Evans, will be strengthened both in relation to the office of public worship and to non-academic counseling.

Administration

The role of university administration is to stimulate and to serve the academic enterprise.

Two new positions have been created to strengthen SMU's top-level administration.

One is an administrative staff officer to report to the President, whose responsibilities will be to establish and direct an office of continuing planning and institutional research; to aid the President in major funding efforts; to work for inter-institutional educational cooperation in the region; and to work in the areas of trustee affairs and the commitment of SMU's several publics.

Dr. Jesse E. Hobson, former director of the Stanford Research Institute and nationally recognized educator, was named to this positon, as Vice President, on May 10.

The second is a Dean of Academic Services, an academic administrator to serve under the Provost with responsibilities for centralized academic services, such as Admissions and Records, Student Selection and Financial Aid, Libraries, the University Press, and others. He will be named in the near future.

At some future time, the position of Executive Vice President will be created. This officer would administer all non-instructional affairs of the University.

In academic administration, the academic deans are given more direct responsibility for the operation of their individual Schools.

Departmental and divisional chairmen in the individual Schools will now be appointed by the dean for a usual term of four years, and present appointments for department chairmanships will end as of September 1, 1963, with re-appointments or new appointments made on the above basis.

Trust and Control

SMU reaffirms with pride its relationship to The Methodist Church.

The Board of Trustees will be restructured to provide for stated terms of service; additional laymen of professional competence to serve on the Board; and nationally known leaders who do not reside in the South Central Jurisdiction of The Methodist Church (which normally elects Board members) to serve as members-at-large of the Board.

The name of the Executive Committee of the Board of Trustees is changed to the "Board of Governors."

Boards of Visitors will be developed for the several Schools and for other programs of the University.

New Funding Requirements

SMU's greatest deficiency is lack of endowment. The Master Plan recommends that SMU establish a schedule of *minimum endowment needs* for the long-range future in the amount of $75 million. This is $61 million in addition to the present endowment of $14 million.

In the next five years—by 1969—SMU will attempt to secure $10 million for endowment, at the rate of $2 million per year.

But SMU cannot afford to wait for the accumulation of increased endowment to fund the Master Plan. So it is recommended that, in addition to the present level of current operating income from all sources, the cumulative operating expense to fund the minimum objectives of the Master Plan from 1964 through 1969 should be $21,780,000.

All of this sum is to be spent on faculty salaries and other items having to do with "people and programs" of benefit to the instructional and research process.

While the University faces its second half century with a good physical plant and reasonably adequate facilities, it will need to complete the Fine Arts Center complex, add needed additional laboratory facilities, and enlarge and refurbish some older buildings, like Dallas, Atkins and Hyer Halls. This will cost $10 million in the next five years.

The summary of funding requirements to reach minimum objectives between now and 1969 is:

1) Endowment (at the rate of $2 million per year): $10,000,000; 2) "People and Programs": $21,780,000; 3) Facilities: $10,000,000.

This totals $41,780,000, but $9,000,000 in additional cumulative income from tuition and endowment income is expected to accrue in this period. Subtracting this expected income from the total above, SMU has reached a figure of $32,780,000 in new money over and above current levels of income to be raised in the next five years.

A campaign will be undertaken to raise this vital money in the future.

It is significant to note that SMU received in gifts during the past five years more than $14,000,000, which is slightly less than one-half of the additional amount needed for the next five years.

This is an achievable goal. With the dedicated help and loyalty of her alumni, her friends, her city and region, and all those who believe in private higher education of quality, SMU will achieve it.

Theme of the Plan

Traditionally, the educational philosophy and program of Southern Methodist University has been rooted in the basic liberal or "liberating" studies: the humanities, the sciences, and the social sciences. It has maintained a balanced core of these central areas of knowledge in the course of each student, no matter what his "major." The belief behind the Master Plan is that these basic studies, and the interrelationships between various fields of knowledge which, when perceived, can bring wisdom, are more than ever important in a professionally and, to a large degree, technologically oriented age. Yet, along with this obligation to educate the "whole human being," there remains for a university such as SMU the responsibility to provide undergraduate and graduate professional training of the highest order for the increasing number of students who need and desire this more specialized kind of education.

The essence of the educational philosophy which undergirds this Master Plan is that these professional studies must rise from this solid foundation of a basic liberal education. The aim of this University, in other words, is to educate its students as worthy human beings and as citizens, first, and as teachers, lawyers, ministers, research scientists, businessmen, engineers, and so on, second. These two aims —basic and professional education, general and special, cultural and vocational (in the best sense)— will not be separated in the program of this University. It is this University's belief that they should not be. For the well-educated person is indeed a *whole human being*. His intelligence and his practical interests interact in all of his major activities. The courses and teaching processes of Southern Methodist University will be so designed that these general and special aims are carried out concurrently and in relation to each other. In this way, it is SMU's aim that every graduate be truly a well-educated person.

This philosophy, and the fact that SMU desires to remain and to become a stronger *uni*versity, even in the face of pressures that are causing the acceptance of the philosophy of the *multi*versity and all that implies, explain in great part the most experimental and perhaps the key element in the Master Plan. This is the new University College. This all-university division, which will affect the undergraduate education of all SMU students, is an innovating attempt to give unity and coherence to the entire educational program of the University, and to the educational career of each SMU student.

The Idea of a University

By tradition and by logical definition, a university is a community of scholars, mature and fledgling, dedicated to the life of inquiry and the communication of knowledge. Such a community achieves its purposes in manifold ways but chiefly through the cultivation of human intelligence and judgment. Its common goal is the educated person, whose interests open out upon a wide range of human problems and values, whose tastes, habits and conscience are informed, critical, articulate, responsible.

At the center of a university there must be a dynamic curriculum in the liberal arts and sciences, designed to liberate and humanize all its members —to liberate them from ignorance, superstition and bigotry; to cultivate in them those traits that characterize the good citizen—in his neighborhood, community, region, nation and world. This curriculum seeks to make men valuable both to themselves and to society, habituated to informed and responsible judgments, disposed to cherish the beautiful, the noble, and the right.

This curriculum in basic education has traditionally been centered in a college of arts and sciences, but it is directly relevant to the purposes of all the schools in a university. Its aims are normally pursued through the study of those areas of human learning which concern persons as persons. These include the humanities and the arts, the social and the natural sciences. However, the humane interests of this curriculum should be integral to curricular aims in all faculties of the university.

A university differs from a college by the plurality of its faculties and curricula. A university may include baccalaureate schools for professional training. Even more distinctively it provides post-baccalaureate programs in both graduate-professional and graduate-research study. What makes it a university is not the number or variety of its several parts but the fact that something significant can be said of all of them together—"as a whole," (for this is the root meaning of *universitas*). The measure of a university is the quality and universality of its character as a community of inquiry and commitment.

At the baccalaureate level, the professional schools have a special concern for the fusion of analytic and applied knowledge. They cannot confine themselves to technical training, for they share with the college—and the university as a whole—the responsibility for the education of the whole man.

At the graduate level, a university is concerned both with professional education (law, engineering, etc.) and with the extension of knowledge through research. The goal may be the training of master practitioners—teachers, ministers, lawyers, engineers, performing artists, business leaders—but always from the premise that technical prowess is a secondary value compared to the ability and disposition to keep abreast of the expanding frontiers of knowledge in one's professional field. In graduate-research training, the university's purpose is twofold: the enlargement of human knowledge and understanding, and the replenishment of the precarious succession of scholar-teachers.

Thus, the chief tasks of a university are: (1) basic education, by which the young are initiated into their human inheritance; (2) professional training, by which society is furnished with competent leaders; (3) research, by which the borders of the known are widened and new knowledge is applied to old problems. These three endeavors pursued by all the members of a university give it its distinctive character among the institutions of modern society.

APPENDIX B

The University College: Philosophy and Structure

Why the College Was Formed

Created by Southern Methodist University's Master Plan for the Academic Future in 1963, The University College begins operations in September, 1964, as a bold educational adventure.

The Master Plan itself came out of a year-long study by the University in consultation with a number of today's great men in American education. It looks with imagination to the future but is rooted in SMU's 50-year tradition of educational stability and leadership and arises from a fundamental philosophy of what a university should be.

A university, by tradition as well as definition, is basically a community of scholars, those who teach and those who learn, dedicated to the investigation of all ideas and concerns relevant to mankind and to the creation, transmission, and preservation of knowledge—and, with success, of wisdom.

SMU's goal is the cultivation of human intelligence and judgment, in these ways:

—By educating its students to be persons whose interests open out upon a wide range of human problems and values and whose tastes, habits and conscience are informed, perceptive, articulate and responsible.

—By freeing its scholars from fear and ignorance and by preparing good citizens for society, through basic, general studies; and by offering professional training in various fields to prepare men and women to take an important, creative place in an awesome nuclear and space-age world which in many respects is still living in medieval squalor.

—By making men and women valuable both to themselves and to society, educated to the uses of intelligence and disposed to recognize, cherish and safeguard the beautiful, the just, and the true.

This philosophy means that even in the professional schools of business, engineering, the arts, law, and theology the emphasis is as much upon the intellectual, spiritual, and social development of the "whole" human being as upon the particular skill and knowledge needed to perform within these professions.

And at SMU the entire teaching process now begins in one place: The University College.

This philosophy of education, SMU believes after careful study, has never been so valid and essential as it is now. For this nation—indeed, the world—needs greater numbers of economists and statesmen and scientists and journalists and engineers and scholars of all kinds who are oriented in the history and motivations of peoples of dissimilar origins and customs. As knowledge builds upon itself and continues to enlarge man's view of himself and the universe in an age of scientific and moral revolution, the world needs, above all, a profound and courageous deepening of all the awareness that relate to persons as persons and human beings as human beings.

Under its own well-established traditions and its new Master Plan for the future and through its just-beginning, exciting University College, Southern Methodist University is determined to carry out this challenging and vital role of education.

What the College Is

The University College is the academic agency which will put into practice SMU's belief that a strong liberal education is essential and is the primary responsibility of the combined best resources of the University as a whole—its faculty, administrative staff, and physical plant.

All beginning freshman students will enter the College, regardless of what their ultimate major field of study might be.

The entire faculty of the University will be the faculty of The University College. Under this plan, top professors in their fields will teach incoming freshmen.

The student will take courses in the College through his four years in the University.

The University College will not offer a degree, but will give each student a set of general liberal studies which are an integral part of every bachelor's degree curriculum in SMU. All work taken in The University College will be a credit-bearing part of his degree requirements.

From The University College, the student will enter one of these SMU schools: The School of Humanities and Sciences, The School of Business Administration, The School of the Arts, or The School of Engineering. Post-graduate degrees are offered in all of these schools.

In addition, SMU operates The School of Law and Perkins School of Theology.

In short, The University College provides:

—An academic counseling service to assist all students before they enter degree-granting programs.

—The basic education required by the degree-granting schools, conducted by the appropriate faculties of the University as a whole.

—Interdisciplinary courses—those studies which tie together several fields of learning to develop a well-rounded view of life along with specialization in one area of concentration—required for all curricula of SMU's degree-granting schools.

—The academic structure for exceptionally gifted students to begin work under an honors program, and certain experiments in offering some independent study for all students.

The direction of the College is in the hands of its dean, Dr. John Hicks, and a University College Council of 14 faculty members who come from all schools of SMU. The Council is responsible for general admissions to The University College, the curriculum of the College, correlation of the work of the College with the degree programs of the University, and the working out of teaching assignments using the most able professors available.

All courses in a given discipline will be taught by the SMU faculty members most proficient in that discipline.

Academic Advisers for The University College have been chosen from among the professors of all the schools. If a student shows early interest in any area of study, he will be assigned to an Academic Adviser who best knows that field. A major strength of The University College will lie within this system of careful counseling for each student, providing the student sound orientation and making it possible for him to see the various opportunities for gaining knowledge.

Selections from the Discussion

There was a misunderstanding, lack of proper communication, and so we tried to pick some of these anti-administration people, put them right on the committee, and it worked out very well. I don't think anybody felt at all restrained in expressing himself.

◆

Our university planning council meets regularly and I'm chairman of it. It's a pretty large group with all the vice presidents and all of the deans and elected representatives of the faculty—there's a group of about 25 people and they feel very free to say anything they want to say—critical of the president, critical of me, critical of anybody and this is leading to better feelings and certainly better understanding.

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One of the reasons for picking the committee of 50, which is an outside group, outside the university, was to establish communication with the several publics of the university and one of the principal reasons for the university planning council is communication—between the administration, the academic administration and the faculty.

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The president was the leader of the planning process, every step of it. He spent a very large part of his time during that year planning and we tried to do a job much too fast. The job that we did should have taken three years rather than one. The president spent more than half of his time in planning.

◆

In the five year program, only $10 million will go into physical facilities (and this includes revamping and refurbishing) and $25 million of it is going into people and programs.

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Our feeling was that every faculty member is a member of his department—or faculty—that's where his home is. If he's a professor of history, then his home is the department of history and his salary and promotion and everything are determined by the department of history and the dean of the school of arts & sciences and not by the dean of the university college, even though he might be teaching in the university college. We don't intend for anybody to teach full time in the university college—they're to teach in the university college only one course or a part of the course.

First of all, we did months of planning without ever thinking of dollars, deciding what kind of university it should be. We made the decision on how large the university should be, not based on dollars. The size, the enrollment (we are a private institution, therefore we can control enrollment) was determined largely by maximal utilization of the physical plant already in existence. SMU had a very good physical plant and we decided that the best thing for us to do was to try to utilize our existing plant with only few additions, some refurbishing and revamping but no major additions and that meant increasing undergraduate enrollment—some 1,000 increase in graduate enrollment—and then we decided what the program of the university should be and we dropped some things. We dropped the department of home economics, we decided we would not develop a school of journalism, although there's a lot of pressure for us to do so, and we decided we would not go to the doctoral level in the department of education—we would not have a school of education—we'd just have a department of education—we decided we would not go to the Ph.D. level in business. We did all those things and then we began translating the program into money—people and programs—what kind of a faculty does it take to do this job, what kind of research program does it take to see these objectives and how much does it cost to do that? Now I think some people are inclined to make a start with the physical planning of an institution, the buildings and so on before they think too much about the educational program and I personally feel very strongly that university planning, particularly, should start with the planning of the educational program and that we think first about the people and the program and the research and the scholarly work and then the building.

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The student-teacher ratio comes out to be 15-1 in our plan.

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Most of the courses of the university college are designed to be either three or six hour courses and a three hour course would have one big lecture group and two small group sessions.

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I think there were two purposes behind the original establishment of SMU—one was to serve the city and the region at the university level; the other was to serve the ministry with a School of Theology.

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I've heard our president say many times that he thanks the Lord every morning that we don't have a medical school to worry about.

We decided that the department chairmen are really serving as a part of the administration of the university. The department chairmen will be appointed by the provost. We went away completely from the system of faculty election of department chairmen. One of the reasons for doing that was an attempt to develop better communication through the administrative channel of the university. The department chairmen are really the academic leaders in the system in many respects. That's the firing line and we felt we needed much better communication. The faculty has a lot of authority, a lot of responsibility, and they take it. For example, we didn't go into any curriculum matters at all in our planning. We left that entirely to the faculty. In the university college concept we outlined a university college . . . but left the curriculum entirely in the hands of the faculty, but we did feel we needed to change our department chairmen and that we needed to put more responsibility on the department chairmen, we needed to expect more from the department chairmen.

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We've thought all year about the funding, we've visited many institutions to see how they've handled their development program and the kind of staff it takes and the kind of public relations and everything else it takes and we've been spending this year getting ready for it and I think in about six months we'll actually be ready to implement it. This is one of the mistakes I think we've made—I think we tried to do this too quickly—we should have taken longer than a year. Another mistake we made was that when the master plan was announced, we announced the funding requirement and they expected us to follow through with requests then. We weren't ready to—I think it would have been better if we had not mentioned dollars at that time; also we did some later calculations and revised our figures and you can guess which way they went—they went up. I feel it would have been better if there had not been the publicity about the major funding.

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We started the year of planning with a lot of information missing; we didn't have all of the statistics we needed; we didn't have all of the data we needed. The university never had an office of institutional research and there was an awful lot of information we wished we had that we didn't have.

I don't want to over-emphasize engineering just because I'm an engineer but the engineering school was under the heel of scrutiny and criticism in the community and that's why it came in for a lot of consideration. SMU's engineering school was patterned after the University of Cincinnati with 100% co-op program and eight weeks in and eight weeks out. This was terrible; the courses for the engineers had to be given specially to the engineers, so they lost the advantage of being in a university. That had gone on for years and years. Because SMU is on the semester plan, they felt the semester was too long for a co-op, so they went to this half a semester business—the engineers might as well have been 100 miles away as far as taking advantage of the school's humanities and sciences or anything else on the campus.

◆

Another difficulty came with the university college. We wanted the best people in the university to teach the freshmen and sophomore courses, but we didn't give the dean in the university college a budget so that if he wanted Professor A. in the School of Theology to teach a course on the nature of man, he would have to go to the dean of the School of Theology and beg for the services of Dr. A., but he couldn't offer to pay for the services of Dr. A., so they put an extra burden on the budget of the dean of the School of Theology. We see now that was a mistake. We're going to have to give the dean of the university college a budget so that he can buy the time of the people that he and the faculty of the university college want to teach in those inter-disciplinary courses. So there are some changes like that coming along.

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There's a great similarity between this planning process, at least the way we undertook it, and psychoanalysis, and I believe a psychologist or psychiatrist will tell us that this is what goes on in the typical psychoanalysis; that there's a period where the morale of the patient is very low and all the trouble comes out. My goodness, the minute we started, all the gripes and everything everybody had on his chest came right out and life was pretty miserable around that place, and it began to look like the university had fallen apart, that it never would be brought back together. People were feeling awfully low, but after a few months of it they got everything off their chests—they said everything there was to be said and then they began to think about it. I don't know what happened other places, I expect low morale may be attendant with this critical self analysis.

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The Institution and the System: Autonomy and Coordination

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The vice-president of a university, which was an integral part of a system, spoke with a slight note of exasperation in his voice: "We don't wany any more studies. Just give us the money!"

His words echoed the feelings of many administrators reacting to the seemingly endless requests made by the central office to affiliated units. The vice-president wanted funds for a project, but the central office required additional studies for justification. To the university official, further study represented only a delaying tactic—a ruse to save money by prolonging its expenditure. It appeared to him, at any rate, that the central office obstructionists had devised another stumbling block, hoping he would fade away with his project or become lost in a labyrinth of red tape.

The vice-president's attitude is characteristic of many officers in institutions webbed into a system governed or coordinated by a central board. As a system unit, can a college or university formulate its plans independently and determine its own destiny? Does the system encroach upon its autonomy? What are the system-institutional relationships which affect long-range planning? Which planning elements are best undertaken at the local level as compared with the system level? How can educational planning be improved? How can rapport between the system and the institution be nurtured for more effective educational planning? These questions present a challenge which becomes the burden of this report.

Coordination Affects Most Institutions

A system* is defined herein as two or more institutions governed by a legally authorized board, or whose functions and policies, in part at least, are reviewed by a board legally designated to regulate, supervise, advise, or coordinate these institutions. The term "system" as used here applies to a group of institutions responsible in some measure to either one of two types of boards defined by Martorana and Hollis:

> **Coordinating Board**—A board which is legally responsible for organizing, regulating, or otherwise bringing together the over-all policies or functions (or both) in areas such as planning, budgeting, and programing, but which does not have authority to govern institutions. (1960)
>
> **Governing-coordinating board**—A board having legal responsibility for functioning both as a coordinating board and a governing board for two or more institutional units which offer programs that have common elements. (1960)

Systems operating under these two types of boards may be viewed in California. Both the Regents of the University of California and the Trustees of the California State Colleges, as *governing-coordinating boards*, govern as well as coordinate institutions in their respective systems. Similar examples of governing-coordinating boards exist in neighboring states: the Oregon State Board of Higher Education, the Board of Regents of the University and State Colleges of Arizona, the Trustees of the State Colleges in Colorado, and others.

On the other hand, the Coordinating Council for Higher Education, as a *coordinating board* for California, has legal responsibilities for limited coordinative and planning functions. Relative to these functions, a "system" of higher education is conceived as constituting all public colleges and universities in the state. Other states with similar coordinating boards are Illinois, Kentucky, Maryland, Missouri, New Mexico, North Carolina, Oklahoma, Texas, Utah, Virginia, and Wisconsin. In each of these states, the coordinating unit functions as a "super board" or a "liaison board" between the institutional governing boards and state government.

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*Many private colleges and universities are involved in systems, mostly denominational in nature, but these are not treated directly in this discussion. Excluded from consideration also are the affiliations of institutions with national organizations, accrediting agencies, regional compacts, etc.

In 1960, it was reported (ibid) that nearly two-thirds (62.6%) of the public institutions studied in a nationwide project were in a system which was responsible to a governing-coordinating type of board. Also, 16% of the public institutions were found to be responsible to one of the eight coordinating agencies identified at that time, although most of these institutions were also under the jurisdiction of the governing-coordinating boards. Currently, in the thirteen WICHE states, three coordinating boards* and eleven governing-coordinating boards regulate and govern systems of higher institutions.

It is doubtful if a completely uncoordinated group of state institutions exists in the United States. Governors, legislatures, and other state agencies often assume the role of a coordinating agency, if one is missing—and sometimes even when one is established! Public junior colleges, usually governed by local boards, are frequently responsible to State Boards of Education for limited programing.

Martorana (1962) reported two years ago that coordination on a state-wide basis, affecting all or a major part of the publicly supported higher institutions, existed in forty of the fifty states. Since his report, two of the ten "free" states have initiated coordinating agencies. One needs only to review recent state-wide surveys of higher education to realize that most of them advocate increased coordinative relationships in one form or another. It appears, therefore, that in the public domain, colleges and universities must cope increasingly with off-campus policies, be they directive or non-directive, under the canopy of "coordination." Long-range planning by higher institutions is affected for better or for worse by such coordination.

Long-Range Planning: A Context for System-Institution Relations

Planning is a coordinative function which intricately relates the institution with the system. Few other activities bring the issues of autonomy into such sharp relief as does this function, for it crystallizes ambitions of both parties to fulfill what may be conflicting interests. Exploration of the planning process as it relates to systems and institutions, is discussed here to provide a context for further consideration of autonomy and cooperation.

Planning may be defined as a systematic attempt to chart the course of an enterprise. In practice, it is often a collective effort to formulate tentative and acceptable goals of an institution in harmony with anticipated needs and resources.

The major benefit of a plan is its motivating and unifying effect toward institutional action. It tends to focus attention upon problems and needs and forge agreements toward solutions and remedies. Its capacity for inducing change is enhanced if the objectives are clearly identified, feasible of attainment, and associated with widespread benefits. Further, the planning process itself, if appropriately designed and conducted, tends to link the planners with greater mutual acceptance and affinity.

Long-Range Planning

Long-range planning, as contrasted with routine decision-making, is an opportunity for more penetrative orientation and wider perspectives. Analysis and synthesis of a large number of complex interlinking operations to uncover unifying policies is possible.

Planning is not a one-shot effort. It is continuous in the sense that an institution should always have a plan. In practice, however, planning tends to be cyclical in nature, because plans need to be recast periodically as conditions change. When rapid changes occur during times of crises, more frequent planning is needed. In post-war California, for example, the "Strayer Report" was undertaken in 1947-48, succeeded by the "McConnell Study" in 1953-54, and followed by the "Master Plan Survey" in 1959. (Deutsch, Douglass, and Strayer, 1948; McConnell, Holy, and Semans, 1955; Master Plan, 1960.) Will the planning cycle bring a "Restudy of the Master Plan Survey," circa 1966, or will intervening studies by the Coordinating Council obviate this need?

Obviously "long-range" is a loose and relative term. In a sample survey (Emch, 1960) of planning by public higher institutions, it was ascertained that 34 percent had plans which extended from six to ten years, and another 23 per cent beyond ten years, making 57 per cent with plans extending into the future more than five years.

System plans, in general, tend to project over a longer period. This author's review of sixteen recent state-wide surveys indicates that the average planning period, as evidenced by forecasts of enrollments, population, fiscal data, or other projections, is thirteen years. Six of the sixteen studies contain ten-year projections, plus or minus a year, but most extend beyond ten years to as much as a twenty-year period. A common practice is to project planning data to a popular target year such as 1970, 1975, or 1980.

One of the limiting factors in determining the length of such plans in public systems is that enrollment projections, constructed through the cohort survival technique applied to school enrollments, provides estimates for twelve years in the future or, by utilizing birth rates too, extends them to an eighteen-year period with some degree of confidence.

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*Two coordinating agencies for junior colleges also are found in the WICHE states.

Plans: System versus Institution

A review of both systems and institutional surveys indicates common elements. Wilsey points to seven distinct phases of the planning process: philosophy, objectives, programs, organization, staffing, facilities and financing. (1962) An alternative method of visualizing these common elements is revealed through the following questions:

(1) What is to be accomplished (objectives, assumptions, background information)?

(2) What conditions are required to achieve the objectives (enrollments, programs, staff, plant, equipment, public relations, etc.)?

(3) How can the plan be funded (anticipated income, desired level of funding, means for achieving the difference)?

(4) How can the plan be implemented (procedures, organization, time-table)?

Although common topics appear in system and institutional plans, procedures and perspectives differ. Compared with the institutional plan, generally the system's plan discriminates more of its variables quantitatively than qualitatively; utilizes comprehensive data to measure the perimeters of the system; places emphasis on such matters as state-wide educational opportunities, differential functions and programs, faculty demand and supply, relations with state government, procedures for equitable distribution of funds, etc.; formulates policy controls and coordinative organization; displays more sensitivity to broad public sentiment and pressures, particularly those arising from taxpayers and legislatures, and less regard for local idiosyncrasies.

By contrast, the institutional plan devotes more attention to qualitative assessments of its elements; makes descriptive studies of institutional operations and programs; emphasizes such matters as student selection, curriculum revision, faculty recruitment and deployment, need for facilities, funding requirements, etc.; reviews the administrative organization as a means of facilitating programs and functions; and is sensitive to the idiosyncrasies and dynamics of institutional constituencies—students, faculty, administration, governing board, and alumni.

Improvement of Planning

Common pitfalls are encountered in both system and institutional planning. Incited by outside forces—the pressures of enrollments, tight fiscal prospects, legislative clamor for reduced competition, preparation for accreditation, etc.—the planning project often races through a series of handicaps: utilizing survey personnel characterized more by availability than competence, concentrating upon a few pressing problems without exploration of intricately related variables, striving for a grand design—a paragon of efficiency and economy—without expending sufficient funds or effort on the project, formulating judgments and policies without adequate back-up information, and searching for quick solutions without sufficient time for penetrative or reflective thinking. Thus, with meager pre-planning, skimpy funds, deficient staff services, and severe time restrictions, too many planners arrive at expedient policy recommendations without thorough evaluation of assumptions, exploration of imaginative alternatives, or adequate provision for implementation and follow-up.

How can educational planning be improved? A few ideas pertaining to survey methodology are suggested herein, although it is recognized that the greatest asset in any planning project is the competence of a skilled and imaginative planner.

(1) *The objectives should be defined sharply.* If the objectives of an educational plan are described in specific, measurable terms, rather than in utopian generalities, more trenchant thinking can be infused into the policy recommendations. In this instance, incisiveness is not to be confused with rigidity. Further, well-defined objectives, toward which progress is measureable, usually spur more decisive action in fulfilling the plan.

(2) *Analysis should comprehend dynamics.* All too frequently, surveyors study a series of discrete and isolated problems without comprehending the overall dynamics of institutional processes and functions. What is termed "system analysis," whereby intricately related institutional processes (systems and sub-systems) are carefully analyzed to chart the sequential flow of services and activities (instruction, administration, funding, etc.), provides a useful visualization—a gestalt—of vital patterns.

(3) *Survey data need to be interrelated.* As a corollary of (2) above, surveyors need to synthesize data around central institutional functions and processes. Usually survey probes are launched independently of each other and seldom interrelate except possibly for simple unit-cost information. If these data describe elements of the educational process, for example, their synthesis would permit the identification and analysis of many critical factors which contribute to instructional productivity. Common denominators for the integration of such measurements might possibly be the student credit hour, the FTE faculty load, or the course-of study for a degree. Sophistication in institutional measurement is needed for improved planning.

(4) *Computer science can contribute to planning.* In this age of electronic technology, the educational planner need not always "fly by the seat of his pants" over uncharted terrain. Although a machine can never create a policy or make a decision, it can compile a vast array of information to facilitate better judgment.

Just as the scientist utilizes high speed computers to plot the course and control the guidance system of a satellite, so the educational planner can simulate a model of an educational venture, execute the plan, and measure the results via a computer—all this before the plan is implemented. This "dry-run approach" to educational planning has been employed for class scheduling and space utilization, but planners could extend its application to innumerable problems of institutional services, such as staffing, library needs, plant maintenance, counseling, health services, etc. One intriguing challenge in the pretesting of education models is the feasibility of "pricing out" alternative operations and programs prior to enactment.

(5) *More basic research is needed to supplement fact-finding.* When the educational surveyor undertakes descriptive measurements, his task is largely one of counting. Through intuition and experience, he surmises certain generalizations from these data about institutional needs. Unfortunately, as he postulates these hypotheses, he has available only a limited body of educational research to relate action with needs. Unlike the physician who can dip into a vast reservoir of scientific information relating symptoms with therapy, the educational planner has recourse to a far less definitive and systematically organized body of knowledge and, not infrequently, even this limited resource is overlooked. A considerable amount of productive research has been directed toward students but only a modicum toward educational institutions.

The Pros and Cons of Coordination

The foregoing discussion on the nature of planning, differences between systems and institutional plans, and suggested improvements is intended to illuminate the landscape on which the battle of coordination versus autonomy is joined. A conflict is inevitable because coordination implies discipline and restraint, autonomy suggests freedom and independence. Planning provides a propitious battleground; it asserts the will and encroachments of both contestants—the institution and the system. Do plans for system-wide coordination undermine institutional autonomy? Can an institution plan independently of the system? What support can be marshalled for both sides of this fray? Is a truce possible?

The Case Against Coordination

The rise of the American higher education system, characterized by its abundant diversity which makes both quality and opportunity for education available to a wide range of the population, can be attributed to the traditional independence and autonomy afforded higher institutions. Only conjecture can be made of the resulting mass mediocrity which would enfeeble the American culture and economy if the government had prescribed a Napoleonic type of lock-step system of higher education.

M. M. Chambers, a strong advocate of "voluntary coordination," affirms:

> The spirit which underlay the institutional rivalries of the early part of this century was far from being wholly bad. Today college and university presidents are not all rampant "empire builders" bent upon the aggrandizement of their own institutions and heedless of the statewide system . . . But the notion that by and large they are incapable of grasping statewide problems, that they invariably allow self-interest to override the general public interest, that they are a feral species which somehow most be netted and caged and held within the restraints of a rigid bureaucracy, is not only erroneous to begin with, but also, if effected, destructive of the essential spirit without which colleges and universities do not thrive. (1961)

It may be contended, then, that institutions were faring well in "the good old days" before the development of modern coordinating agencies. Perhaps this contention explains why, as stated by Martorana, "Coordination in a very real sense is something that to date *has been done to* colleges and universities, not something that *has been done by* higher institutions." (1962) The image of the coordinating board is that of an interloper which has disturbed the peace and tranquility of an ivory-towered Shangri-la. Admittedly, coordination, when rigidly applied in a system characterized by over-centralization of authority, is demoralizing.

One of the inherent dangers in over-centralized planning and direction in a system is the tendency of the central governing or coordinating agency to instigate uniform policies as controlling devices. When one is removed from the myriad complexities operating on a particular campus, it is difficult to discriminate among institutional needs without appearing to be arbitrary or capricious. Particularly in rendering decisions on operating funds and capital outlay, the central agency can easily be accused of arbitrariness or favoritism. Thus, the most defensible stance for the central leadership is decision-making through broadly uniform policies and procedures. Not infrequently, however, institutions find that conformity to such rigid policies is at cross-purposes with good management practices.

One means of exercising uniform control in funding and staffing functions is through formulas —which have the effect of elevating a decision from a personal bias to an objective inequity. In many cases where formulas are used extensively by a system— as in Texas, Mississippi, the California State Colleges, and elsewhere — they become sliding points of negotiation rather than valid measures of need Unless applied to identical institutions (are there any?) or used as a protective blanket to shield institutions from partisan influences, formulas in their unrefined state of development have limited utility.

Another hazard in system planning occurs in efforts to eliminate wasteful duplication. The inclination of coordinating agencies is to prescribe differential functions by adhering to the *status quo*. This tendency creeps into the process of reviewing proposals for new programs and new degrees. Small or young institutions, impelled by natural ambitions to become larger and more serviceable, are stymied in reaching their objectives. The reviewing agency usually claims these proposed programs are an unnecessary duplication of state services, that unit costs will increase too much, or that competitive conditions will jeopardize the quality of existing programs through dilution of enrollments and funds. Usually junior colleges and special purpose institutions are hardest hit by this process. Universities with comprehensive curriculums and degrees are protected thereby from in-state competition. In a sense, the freezing of institutional functions is often unfair to the "have not" institutions, although it may protect the diversity and efficiency of the total system.

Another danger is encountered in coordinating agencies which plan to effect economies through the grouping of services in the central office. For example, an agency may attempt to centralize the administration of such items as payrolls, purchasing of supplies and equipment, printing, and even personnel recruitment. Although these "housekeeping" services are regarded only as routine functions, difficulties arise when they interfere with efficient local management. Policies regulating these services tend to be inflexible, hindering the campus administrator from exercising judgment and common sense in decisions that can not be delayed or that require exceptions. Those who control the mechanics of such staff services are frequently in a position to influence the academic program of an institution. Indeed, nearly any local policy or decision can be harassed, expedited, assisted, or undermined by interference with any of these routine services. Moos and Rourke (1959) fully document this point of view.

In particular, the influence of centralized services can be deadening to local management in the areas of personnel and budgetary controls. If stringent personnel policies are prescribed by the central agency, which is operated by officials who have no direct responsibility for performing the operating tasks, a division of functional operative authority is created which can be grossly inefficient. Through fiscal controls, particularly through line-item reviews by a central agency, unwarranted discretionary powers are thrust into the hands of those who are less familiar with local operations. It becomes possible for an outside reviewing agency to criticize, curtail, and influence the alignment of a budget—one which perhaps was meticulously formulated and balanced by local administrative officers. Centralized control of budgets and personnel introduces organizational schizophrenia which splits management responsibility between the central office and the campus.

The greatest danger in system planning dominated by the central staff is its stifling effect upon local initiative and creativity. If carried to the extreme, the administrator's role becomes a cut-and-dried routine task of carrying out predetermined policies and decisions, thus leaving little room for creative and imaginative performance. If bureaucratic-minded individuals in a system begin to usurp local management powers, those responsible for administering and supervising local functions lose interest, pride and initiative. Sensible management practice would suggest that, to the maximum extent possible, management controls be placed close to the operations they regulate. A system is only a means to an end and should not be viewed as exerting preeminence over the functions it serves.

The Case for Coordination

Through a series of developments during the past century—notably the Morrill Act of 1862, the rise of great state universities, the birth of junior colleges, the spawning of government-supported research and training on the campus during wartime, the G. I. Bill, and the post-war explosion of contractual services for the space-age—higher education has become a foremost instrumentality for achieving our national purposes. With its contributions now recognized as vital to the welfare of society, the higher institution can no longer remain aloof on Mt. Olympus, as in former years, but its presence is felt in the marketplace, the legislative chamber, and the Pentagon. Its involvements commit it to service and, hopefully, leadership in the interest of the public which supports it.

The enmeshing of higher education in our social structure and linking of higher institutions with broad social purposes set the stage for increased coordination in one form or another to protect the public interests. Retreat is impossible, but if we follow the main currents of our economic-social life, we must go where the stream carries us.

Another consequence of this development is the coalescence of educational institutions into larger units, thus heightening their efficiency in serving the public. This trend merely reflects widespread transformation of our social structure to meet the requirements of a shrinking world. Just as the corner grocery has given way to the large chain store, so modern business, government, church, labor unions and other social institutions have syndicated or federated into large aggregates. Again, coordination becomes a vital mechanism for gaining efficiency in a pluralistic society.

Further, the recognized interdependence of an increasingly mobile population, fused by mass communication and supersonic transportation, poses a reinterpretation of the term "local" when associated with "autonomy." Those elements which formerly nourished independence and self-determination in a small community are largely either diminished or retained on a state, regional or national level.

It is archaic to think of autonomy as the particular province of a small group—even a campus group. Self-direction of one group may obstruct the "autonomy" of a larger public.

Coordination, then, is the order of the day. As indicated in the early part of this paper, coordinated systems of higher education are becoming widespread and the number of affiliated institutions is increasing. If the trend is inevitable, then institutions must learn to cooperate with the inevitable.

If coordination is important, how is its significance manifested in planning? The contention presented here is that system planning, if conducted properly, is not only beneficial but also necessary to institutional planning. Indeed, institutional plans may be greatly hampered or curtailed if not launched within a suitable framework of the broader interests of the system. Actually, such plans have a complementary relationship with each other.

For illustrative purposes, one might visualize an educational system as analogous to the solar system. The sun and its planets, with their accompanying satellites, create a total system whose movement represents an intricate balance of complex forces. Within this field of forces, each body exerts some influence, even though imperceptible, upon all the others. Their total movement, then, is a composite of all these forces.

In an educational system, particularly a state-controlled system, wherein the institutions serve interrelated and overlapping publics, educate students of similar interests and capacities, depend upon the same source of general funds, and are responsive to the same citizenry, then these institutions, too, are bound together in an intricate system of forces which planners can not overlook.

For example, institutions which recruit students from a broad segment of the public served by other institutions within a system can not construct realistic enrollment projections without careful analysis of the drawing power of other institutions. Enrollment projections made in California, Utah, and other states depend upon state-wide coverage for their validity. Studies of faculty demand and supply, distribution of legislative appropriations, and coordinated programing also require system planning.

Secondly, system planning, if appropriately undertaken, can identify the larger elements or forces bearing upon the institution and, sometimes, cope with these forces better than the institution. The claim here is that frequently central planning identifies the forest, whereas the more parochial plans of institutions consider only the trees.

For example, legislators are sometimes confused by a cacophony of extravagant claims and plaintive demands by institutional spokesmen, each pleading his own case. Through system planning, however, legislative preparations can be made to show a combined balance sheet which can allay these confusions.

Likewise, the public image of higher education in a state is sometimes blurred in the eyes of the taxpayer. An institution may stimulate a vigorous climate of support among its own constituents, but the combined impact of institutional propaganda creates a "Tower of Babel" for the public-at-large. Again, the semblance of order, created by a skilled and experienced spokesman for the system, tends to alleviate this condition.

Thirdly, system planning sometimes exhibits a quality of "balance" or "realism" which does not always characterize institutional efforts. In this respect, the system plan may set a framework within which institutional potentialities can be viewed more realistically. Institutional planners, on the other hand, project the highest level of development for their constituents. A planner unpossessed of this ambition is not worth his salt. But in a system, the optimal development of one institution may mean encroachments upon others. Central planning usually involves inter-institutional working groups (California Master Plan, Utah Coordination Study, Illinois Master Plan, etc.) whose recommendations tend to view the total development of the system as having preeminence over maximal development of a single institution. Thus, the system point of view leans toward a balanced judgment, rather than a protagonist's ambitions.

Another advantage of central system planning is its inherent capacity to correct or compensate for the mistakes of local administrators. The heads of educational institutions are not infallible. A college or university president, for example, may be selected because of his scholarly reputation, not his managerial abilities or experiences. Occasionally he succumbs to the illusion which Harold J. Laski has pointed out as a tendency of the specialist to assume that his expertise cloaks him with authority in all fields. He may appear before budget hearings by the central agency or legislative groups in order to document his case, displaying an abysmal ignorance of the fiscal facts of life. Fortunately, in some cases a more knowledgeable budget officer comes to the rescue.

One discriminating test of the managerial capacity of a college administration is the quality of planning developed through its leadership. Request an institutional master plan and note its clarity of purpose, documentation, imaginative direction and design, its comprehensiveness, and its practicality. In too many cases no such plan has been developed locally. Sometimes it is fragmented throughout the campus: a few building plans in the development office, enrollment estimates in the registrar's office, some curriculum speculations in the dean's council, dreams of desirable staff emoluments in the faculty senate, and the institution's over-all guiding purposes and objectives in the catalogue, where they have been inscribed since the last accreditation visit five years ago!

The central governing or coordinating agency tends to stimulate, or even pressure, local administrators into planning activities. Although local officials may feel harassed by the central leadership, they also see the necessity for establishing guidelines and policies which clarify the role and functions of the institutions. Further, the justification for new programs, appropriation requests, extra expenditures, etc., tends to sharpen the capacities of local administrators for thorough documentation of their requests. Undoubtedly, central office requirements tend to discipline and sharpen the planning acuity of the local administrative team, which is a beneficial exercise unless carried to an extreme.

One of the major contributions derived through the leadership of an effective central agency is the development of management data which facilitate effective institutional planning. Involved in the pressures of daily operations, local administrators sometimes overlook valuable planning resources which they develop and use later as participants in central office projects. Perhaps enrollment projections are the most common types of data initiated by central office leadership. Studies of unit costs, space utilization, admissions standards, personnel, and other institutional factors are also developed in cooperation with the central office. In the states of Colorado, New Mexico, Utah, and more recently in Oklahoma, extensive analyses of curriculums, showing the scope of offerings, student credit hour production, teaching load, class size, and instructional salary costs for each subject at each level in each institution, have been conducted through the state-wide coordinating agencies. These studies are becoming increasingly indispensable for effective curricular management and state-wide planning.

The central governing or coordinating unit, if operated properly, need not be an inhibiting agent. It should be a dynamic force through educational leadership. All too frequently a legislature establishes a coordinating agency as a disciplinary force to effect economies in the burgeoning budgets of institutions. But slashing a budget, which represents the aspirations—indeed the lifeline—of a community of scholars, is the poorest type of control. Rather, coordinating groups should strive to guide the orderly development of programs and services within the state long before the budget is constructed in order to create an efficient educational enterprise. A coordinative approach must be positive and constructive to succeed. In pursuit of this objective, the leadership of a system must possess integrity and persuasive powers. Educational statesmanship par excellence must be demonstrated by the central administrators.

Compatibility through Planning

The issue of centralization versus decentralization has been debated continuously in the United States, at least since the "states versus federal rights" controversy in the constitutional convention of 1787. This issue can not be resolved here. In the first place, a panacea does not exist for gaining all of the advantages of system control and planning without sacrificing some institutional autonomy, or vice versa. Indeed the complicity of relationships between a system and its institutions is somewhat personal; compatibility depends upon the participants involved. Coordinative relationships are indigenous to a particular set of circumstances and, thus, develop unique patterns.

It should be recognized that the struggle for autonomy is not entirely concentrated at the system level: it also exists within the institution. Students may seek independence from their professors, who, in turn, resist the direction of the department chairman. The chairman may desire more latitude of action in his relationships with the dean, who, in turn, would like to evade some of the controls exercised by the top administration. At the same time, the president may be seeking more administrative leeway from the governing board and, perhaps, from the faculty senate. The curious thing about this internal structure is that encroachments upon autonomy at one level may excite a chain reaction which pervades the whole organization. The point established here is that conflicts of autonomy prevail in nearly every social organization. If it is difficult to resolve within the institution, it may be beyond normal expectation to resolve the issue between the institution and the central office of a system.

Not the least of the factors which create coordinative difficulties are differences in purposes, functions and organization of the institution as contrasted with the system. Each of these two units operates from a different posture which, at times, may set them at cross-purposes with each other.

For example, the institution is concerned with the conservation, dissemination, and advancement of the collective knowledge of society. Instructional and research staffs which are charged with this responsibility usually operate in a permissive atmosphere of self-direction. The college or university organization, therefore, is loosely structured to provide freedom and latitude essential for faculty productivity. Such an organization differs considerably from the typical line-staff functions found in business, government, and other organizations.

The central office of a system, either as a governing or a coordinating agency, is concerned more with the supervision of institutions than of individuals. It must deal with such matters as distributing and auditing funds; the planning, capitalization, and construction of buildings; compliance of institutions with policy directives and legal restrictions; the analysis and reporting of operations; etc. These activities tend to describe, evaluate, and sometimes regulate the operations of a group of institutions. More than likely, the central office organization represents more of a bureaucratic structure, characterized by a clear-cut division of labor among its officers and a formal system of rules and regulations. Even so, the central office is usually not as highly bureaucratized as the state government which it serves on the one hand, but neither is it as much a collegial organization as the institutions which it governs or coordinates. (For a detailed discussion of differences between bureaucratic and collegial organizations, as applied to higher education, see G. Lester Anderson, "The Organizational Character of American Colleges and Universities," *The Study of Academic Administration*, Western Interstate Commission for Higher Education, Boulder, Colorado, October, 1963.) Even in routine interactions between these two types of organizations, frictions arise because of the *modus operandi* differences.

In spite of these inherent difficulties, much can be done through planning to strengthen relationships of institutions with the central organization. The following suggestions are advanced as possible means for accomplishing this purpose.

(1) The relationships between the system and the institution should be viewed as complementary and mutually supportive. Institutions need to unite under a strong central leadership in order to achieve some of their purposes. Too often a crisis is required—such as the threat of state control—to rally institutions under the system's banner. As in a democracy where the individual must bow to the will of the majority in established government which protects his rights, so the colleges must sacrifice some freedom by participating in a system which strengthens the institutions.

On the other hand, the central office should view its primary task as one of facilitating the building, developing, promoting, and enhancing of the institutional units. It is a servant, rather than a master. If each party—the system and the institution—will contribute wholeheartedly to this partnership, a compatible union can result.

(2) A clear-cut division of responsibility between the central office and local institutional staffs should be formulated. Many systems, such as Oregon, have formulated guidelines which describe the functions and responsibilities of each institution and the system as a whole. Specificity is imperative in defining roles—not to be confused with rigidity, for roles must be reassessed periodically. The legal prerogatives, planned functions and present services, curriculums, and degrees should be noted.

A useful point is made by Glenny, who believes that coordinating agencies, like the federal government, should have enumerated powers, reserving all unenumerated powers for institutional boards (1959). Coordinating boards are concerned primarily with four functions: planning, programing, operating budgets, and capital outlay.

(3) The central organization should seek to avoid intra-institutional administrative activities. Traditionally, the administration of colleges is the province of professionally trained personnel who grapple with these problems at the local level. External interference in administrative affairs undermines the morale of the professional staff and discourages local creativity and initiative. A board might establish policies to regulate admissions standards, for example, but it should leave the methods of selecting and admitting students to the institution.

The ideal situation is found in a governing or coordinating board which views its responsibilities with both foresight and restraint. Foresight is required to anticipate major problems affecting the welfare of institutions and to devise protective policies which help institutions face their problems. Restraint is required to resist the temptation of devising policies which will exercise control over the almost infinite variety and number of minor activities. To obtain harmony, a board discovers it is equally important to observe the rests as to play the notes.

(4) Whatever types of controls are exercised by the central office should be devised specifically for fulfillment of its limited responsibilities. It is easy to proliferate controlling policies. The governing board or coordinating council's leadership is demonstrated by its ability to govern well through general policies which keep certain controlling reins at the board level but which also protect local institutions from restrictive and picayunish regulations that may undermine their individual self-development.

For example, if a central agency has the responsibility of recommending the allocation of state funds among institutions, it may determine institutional needs by means other than a line-item analysis of the budget. Rather, certain critical points of budgetary information related to expansion, such as enrollment, personnel additions, plant development and maintenance, anticipated changes in instructional items and auxilary enterprises, etc., may yield sufficient information for the critical judgments required.

(5) Easily accessible lines of communication need to be established between the institutional units and the central agency. One of the hazards of a system is that the central governing power may become too far removed from the local units. It can not remain on the local scene to keep a finger on the institution's pulse. Psychological and/or communication barriers may inhibit the central-local organization from functioning as a coordinated unit.

The governing or coordinating board should establish advisory bodies or groups which can represent local points of view in discussions of system-wide policies. Most central boards have such advisory groups, but the way they are organized and how they are used is critical. The productivity of interinstitutional committees is somewhat proportional to their anticipation of the probability of creating changes.

Secondly, significant changes in a system should be reported in the planning stages, not as a "fait accompli." One devious device used by institutions to achieve new programs is a gradual build-up of courses until, when approval is requested, they need only "one or two courses to offer a degree." In any case, both the institution and the central agency should never take precipitous action affecting the other, without complete airing of the problem, resulting in mutual agreements whenever possible.

(6) Competent fact-finding promotes better relations by alleviating distrust. The ability of a system to build a reservoir of factual information to describe current situations and project future conditions is an asset in improving system-institu-

tion relationships. True, data do not resolve controversies, but they shift negotiations to a more sophisticated plane. No other data seem to incite as much controversy as enrollment projections, for these are basic to appropriations, capital outlays, and program expansion.

If the data are derived cooperatively, and receive concurrence by the institution and the central office, they tend to create a common ground for educational planning. Policy formation, based upon the same facts, is less subject to misunderstanding by the parties involved. Again, a cooperative approach in building a bank of data helps create a partnership between the system and the institution.

(7) The quality of leadership molds relationships. Difficulties arise in negotiations if either institutional or system officers consider the other to be less qualified and proficient. Interesting methods of circumventing formal lines of jurisdiction are found. As the chief executive officer of the system must frequently speak for and in behalf of the institutions, it is especially embarrassing if his voice is not effective in top-level conferences with the legislature or the public.

Coordinating councils suffer a grave handicap when governed by personnel policies which apply to state departmental organizations rather than to academic units. Legislatures are reluctant to recognize coordinating councils as higher education units, fearing they will be captured by the colleges and thereby lose their disciplinary value. Consequently, council staffs are sometimes underpaid or poorly selected, as compared with their counterparts in the universities. It becomes difficult at times to recruit able administrators from institutions to accept such posts. Councils need, but seldom achieve, as much freedom from state controls as the colleges they serve.

(8) The organization of a governing or coordinating board relates to its effectiveness. It seems to this reviewer that organization is much less critical in creating effective relations than the personnel involved, but nevertheless it does play a significant role. Large boards (over 15) are difficult to operate. Average size of boards over systems is about 11 members. (Martorana and Hollis, 1960). They are tempted sometimes to organize into subcommittees which delve into various operational areas of the institutions. Subcommittees are useful in mobilizing board energies toward a variety of policy problems, but their value as liaison groups between the board and its institutions is questioned.

The composition of the board or council is one key to its effectiveness. Ideally, board members should represent each institution but champion none. They need the knowledge of a specialist, coupled with the objectivity of a nonpartisan. Such a combination of virtues is non-existent.

One satisfactory pattern for representation without excessive partisanship is to have the membership of the coordinating council include one member from each governing board. The majority of its membership, however, should comprise citizens-at-large, appointed to represent the public's interest. The policy of having a majority of professional educators on the board, each representing his own institution, leads to (a) domination of the lay members of the board, (b) excessive "horse-trading" in board negotiations, and (c) insufficient opportunity for the "public interest" to dominate.

Conclusion

The case of autonomy versus coordination as applied to long-range planning has been presented. The evidence points to a split decision, with each a winner if it is willing to pay a price. But the cost of winning is high, for it involves restraint and sacrifice, which means the subjugation of personal interests to the welfare of the total educational enterprise.

Each of us is willing to fight for autonomy, because we are endeared to the values of personal freedom. But we must ask: autonomy for what?—autonomy to protect the whims and mistakes of an incompetent administration which can hide behind a protective mask of academic freedom?—or autonomy to cloak a ruthless campaign of empire-builders who successfully create a powerful institution by either dominating or undermining weaker ones?—or autonomy to permit public tax funds to be dissipated needlessly by one institution while the programs of others are supported marginally?

No, we must be certain that autonomy is genuinely warranted and responsibly accepted. In this age of interdependence, autonomy is not an inherent right of the institution—it is a privilege which should be merited. It is retained in its finest condition only if it bends responsively to the broader interests of the total system which it serves.

But neither will we buy coordination blindly. There are too many counterfeits which parade as the genuine thing. We abhor coordination as a guise for the domination by a few institutions over statewide educational interests. We fear coordination which is imposed by political interests who want to curtail expenditures by any means possible to reduce the tax burden. We resist coordination which is merely an academic log-rolling exercise, busy in tinkering with institutions rather than providing effective leadership.

It appears, then, that the issue of autonomy versus coordination hinges primarily upon the faith and the integrity of the participants—the institution and the system—to work together toward common goals of service. Mutual respect and cooperation provide the foundation upon which a maturing and compatible relationship can be constructed. Such a climate fosters effective planning.

These qualities are reflected in the famous words of Edmund Burke delivered to the British House of Commons on March 22, 1775:

> All government, indeed every human benefit and enjoyment, every virtue, and every prudent act, is founded on compromise and barter. We balance inconveniences; we give and take; we remit some rights that we may enjoy others, and we choose rather to be happy citizens than subtle disputants.

Selections from the Discussion

Differential functions tend in a sense to protect diversity. All institutions do not thereby become universities. The young maturing institution does follow or copy other institutions in the state. If it tends to be diverse then it has a program which is not competitive with already existing programs and frequently is allowed to proceed, but when it copies the same pattern then it is duplicating a function needlessly and in most cases frequently the differential function type of policy tends to restrain it; so in this modern age of interdependence of institutions, I think coordination is beginning to protect our diversity rather than reduce everyone to a mass mediocrity.

◆

I'm sure that there are no model master plans anywhere.

◆

I think that there are some excellent plans which are emerging from the states at the moment. I like what I see coming out of Oklahoma. They're working on an extensive self-survey and I like the reports that I've been getting. It looks like they're doing a thorough job.

◆

I've seen some wonderful institutional plans. I like personally what I call a classic plan which was a self-survey which came out of the University of Chicago about 1932. It was excellent in terms of presenting a lot of data and a lot of thinking about their problems.

◆

As I interpret the signs of the times, I think that we will tend more and more to come into coordinative machinery, and I wouldn't be surprised to see its structure change; we may evolve into something in the future that's much better than we have now—we'll probably grow into new forms of coordination. Again, as our society and culture change, we're going to have to keep abreast of this thing by having different forms of organization to cope with it.

There will be a tight squeeze for finances which I think will have a very great bearing on impelling more states to resort to more coordination in order to get the most out of the dollar and render the most service for the public interest that they're attempting to serve.

◆

I think voluntary coordination has not succeeded too well and I think it will gradually be replaced by more systematic coordination. Coordination, as I see it, involves one that evolves as being established by statute. And I think this will take place or eminence over voluntary or informal coordination which is not established by statute.

◆

Let me tell you about one thing that we have evolved in our state. As a result of our master plan, we set up the state council on continuing education and this is composed of the extension directors from the various universities and the director of adult education, state department of public instruction, and the evening school director at a local state college and we meet together every month and devise some policy which has to do with extension work and subservices. But we're doing it only on a small scale—a very humble beginning. Actually what we did was to select a problem in a particular community so that all of us working together are bringing the resources of all of our institutions to bear upon this one community to provide any kind of a continuing education which they would like in the most efficient way in which we can so the students can take courses there and get credit at any institution. We're a long way from resolving all the problems in just this one area of continuing education, but I feel that coordination has to grow this way, step by step . . . planned interinstitutionally so that everyone is brought along and we don't take precipitous action which we may regret later. We have other cooperative enterprises among various kinds of educational groups; we got all the librarians together in the master plan and recommended three cooperative library projects. So it is that in one field after another we're gradually making some progress to get the maximal use of our resources.

Informal coordination has been largely a matter of institutional representatives deciding among themselves what to do. Mandatory coordination set up by statute does not mean necessarily that it's forced. It's forced in a sense, yes. But a set-up such as ours has only one power and that is whatever information we request from an institution by law they have to give to us. That's the only power we have. Now admittedly most coordinating groups do carry a big stick behind their backs in terms of legislative sanction and approval and if you get off on a limb and lose that then you have nothing. But even formal coordinating agencies usually do work with institutions so that it's not a force. Occasionally there have to be hard decisions and I guess you could call this an enforcement. But again, I don't know what the future holds. If this doesn't work maybe our legislatures will create some kind of an organization that has much more teeth in it to make it work.

◆

It's been my experience that it's very, very difficult to have this knowledge filter down to the faculty and very frequently they hardly know that you exist or they think that your existence is completely a threat. Some states have wide-spread publications (we can't afford that); in some states there are faculty forums; in our state, for example, all the faculty are invited to sit together just before the university opens. This is called the State Conference on Higher Education. And about two-thirds of our faculty do come. The first year that I assumed this position, I was invited to talk with the faculty, so I had a chance to talk for twenty minutes about our operations. But this is really a touchy problem and a lot of times you think the institutions are coming with you . . . everybody is agreeable . . . then you will find that someone says, "I've never heard of you—what have you been doing? And when are you going to start to do something?" And it's most agonizing, but I found that it's so universal that I think it's a real problem.

◆

We'd rather stay small and advisory and I think this will always be our trend, but I do think that a coordinating agency to be effective ought to have sufficient power to do as we do—collect whatever information it needs; secondly, it ought to have the right to review new programs, new degrees and major expansions of an existing program; and it ought to have the right to review the need for new institutions; and it ought to have the right to be able to pass its judgments onto the legislature about these respective activities. It ought to take leadership in planning within a state; help in state-wide planning of higher education. Now if it does these tasks well so that it gains legislative confidence, then I think it has all of the formal powers it needs.

◆

All appropriation requests to the legislature have to come through our office and we submit a combined budget. But this doesn't stop the institution from submitting its budget and arguing for its own budget. The legislature can hear the institution make the presentation; then they hear us make the combined presentation. But because we do have the power, then the legislators who want to bring home the bacon to their communities, as in the case of one of our communities that wants a junior college, the legislature comes to us for an answer (in this case we said no). In which case, then the junior college is not implemented with funds and we think thereby we're protecting the quality of higher education in other institutions and contributing those funds for existing institutions.

◆

We usually ask institutions to have their boards review the program and approve it tentatively before it's passed to us and the only reason we do that is that we don't want to be a scapegoat for an administrator who is working on a program but by pressure thinks maybe we'll disapprove of it. So to save him the problem of having to take it up with his board formally, we do have a tentative review by the board before it's presented to us; then we give our advice on it and the administrator goes back and does anything he wants—withdraws it or goes ahead and implements it.

◆

I think the traditional history of this thing has been that there is a lot of agitation in the state, mostly in state legislatures, about coordination. The next thing you know they've organized a citizen's committee or legislative council or another group, taken a broad look at it, brought in a couple of consultants and organized a committee or a board and come up with a policy recommendation, often in the form of a statute. This is up to the next legislature and may be rejected or passed, and if it is passed, you may be in business with a coordinating agency. I know two or three states where this is the general pattern, but there are these preliminary steps which usually involve an organization . . . and frequently a master plan or state survey . . . before a statute is proposed.

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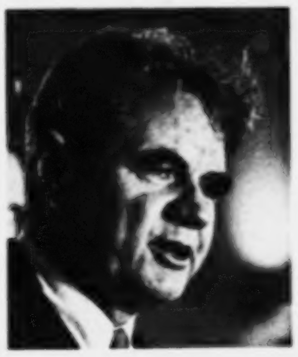
Housing the Educational Program: The Physical Plant as Educational Environment



William W. Caudill, Chairman
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> *The Colleges are mostly in the gothic taste, and much overloaded with ornaments, and built with grey stone; which, perhaps, while it is new, looks pretty well, but is has now the most dingy, dirty, and disgusting appearance, that you can possible imagine.*
>
> *Travels of C. P. Moritz*
> *in England in 1782*

Some time ago a professor of biology from Harvard University told me that because there had been so much written in his field during the past ten years, it was actually cheaper to start from scratch on a research project than to comb the libraries to see what has been done. He was dead serious.

Now the situation in educational architecture has not advanced that far. Nevertheless, the current crop of literature is overabundant. If you dig deep enough in your library or in the pile of current material you stacked in the corner of your office, you can find just about everything—except possibly what you want. Too much, really. You can find books or booklets on how to plan science buildings, libraries, communication centers, health centers, faculty offices, and parking garages. You can find a booklet on how many water closets you will need. You can even find a book which tells you whether you should build your dormitories two stories high or should stack the rooms twelve stories in the air. If you look hard enough you can find information on how you can design a money-making, self-amortizing college. You had better not show that one to your trustees. Much of this literature is either too fragmentized or too stale. However, some of it is fresh and thoughtfully conceived. In any case, most of you haven't time to review all of the literature even if it were packaged in bundles especially to fit your situation. So for the time being, let's be like our biology friend from Harvard and start from scratch. Let's see if we can get down to the essence of housing the educational program.

Space—The Medium of Planning

Let's start with a pasture. I am sure that some of you with obsolete, ugly campuses would like to have that opportunity. I am fully aware that planning campuses is the biggest and probably the worst remodeling job on earth. And you don't usually start with a pasture, but instead with a hodge podge of dissimilar structures arranged in complete disorder. It takes a lot more imagination to remodel than to start from scratch. But that's beside the point. The point is this: if we begin at the beginning—with only the land—then we can develop theories for the development of a campus. And if we are going to solve the complexities of today's higher education then we must have new theories to do it.

So back to the pasture. Let's assume for the moment that we have "x" acres of land. There is not a thing on it except space sitting on top of it. But space is precious. It is like a layer cake sitting on a platter. The platter is the land; the cake the space. I'll take the cake anytime. Space is the thing. We can enclose it. We can subdivide it. But we cannot eliminate it. The problem: How to slice the cake. And we do just that when we set big blocks called buildings on the land. We are slicing this big space into little spaces. This act is so simple that very few people in connection with campus planning realize what has been done. They never think in terms of subdividing outside space, only inside space. By far the majority of university administrators, trustees, and their professors think in terms of building blocks only. And so do most architects. Here's where they get in trouble. They cannot see the spaces for the buildings. But a campus should be space conscious, not building conscious. The campus should be composed of exterior rooms as well as interior rooms. Space is powerful. Put one building in the middle of the pasture and space will accent it better than a large white mat will accent a small picture. Buildings are space dividers. Put three or four buildings in the pasture to form a quadrangle and this great outdoor room may be more important in establishing the environment than the buildings themselves.

No matter how you slice it, space is the medium of campus planners and university architects—not stone nor brick, steel, glass, nor concrete. Space can be static as a clearly-defined room—outside or inside; or it can be dynamic as it flows over and around walls and buildings. The spaces of skillfully conceived campuses have both the qualities of fluidity and confinement. And it is this variety that adds interest and beauty to inspirational places of learning. So when you look at an architectural model of a proposed campus group of buildings and try to imagine the spatial feeling that will occur when the plans become a reality, consider the dynamics of visual space. One way of doing this is simply to imagine the model as a mold with space poured over it. Remove the mold and see jelled space as form. The space is more important than the buildings which serve as the mold. The jargon for this sort of thing is *positive space*—the space confined within the shell of the buildings, and *negative space*—the space that flows around and over buildings.

So now we not only have a pasture to work with, but a theorem as well:

> THEOREM NO. 1: WHETHER IT IS THE PLANNING OF A NEW CAMPUS OR THE DEVELOPMENT OF AN OLD ONE, THE EFFECTIVENESS OF ACHIEVING THE RIGHT KIND OF PHYSICAL ENVIRONMENT WILL DEPEND UPON THE SUBDIVISION AND ORGANIZATION OF SPACE.

We need to think of negative space as well as positive space. Treat it with love and tender care. When we bust it up with buildings, we must know what we are doing. Even the most beautiful buildings can create distorted, ugly, and scaleless outside rooms. On the other hand, a campus with ordinary anonymous buildings can be most pleasant if there is the proper subdivision of outside space. But in the case of our pasture, how nice to have good buildings arranged in such a way as to give exterior spaces a degree of spatial order.

The Hierarchy of Things and People

The most important thing about higher education—secondary or elementary, for that matter—obviously is the *student*. Give me good students any time over good professors. I am a professor of Architecture, but I must confess that talented, motivated students can become good architects in spite of my pedagogic inadequacies. The next most important thing is the *professor*. Give me an apt professor over a good educational program any day. You can design a program around good teachers, but you can't implement a program without them. The third most important thing is *educational program*. Unquestionably the curricula are important—and very important—to the development of our young people, but not as important as good professors. The fourth most important thing about education is the *buildings* and their facilities. If you have good students, good teachers, and a good program, you can produce good people if you have sufficient space. On the other hand, how nice to have all four, which includes inspirational space and up-to-date teaching equipment. As you know better than I, a building on your campus can be a wonderful teaching tool or it can deter teaching.

Of course it takes more than a pasture and buildings to make a college or a university. I would *like* to say here that the most important thing about a college or university is its president or his top administrators. I would like to say this to this group to win the popularity contest. But I won't. Because I simply don't believe it. The student is more important.

This leads us to another theorem concerning the hierarchy of things and people.

> THEOREM NO. 2: BUILDINGS ARE IMPORTANT, BUT NOT AS IMPORTANT AS THE STUDENTS, THEIR PROFESSORS, AND THEIR PROGRAM.

To rate buildings so far down the list is architectural heresy, and I'll probably have my license revoked.

Back to the pasture. Theorem 1 says exterior space is as important as interior space. Theorem 2 says people and program are more important than buildings. Is this minimizing architecture? No. Architecture is space and it belongs to people. So instead of minimizing the importance of architecture, I am really enlarging its scope, and in turn, its importance. So be kind to your architect. His work can help you build students as well as buildings. But don't let him work in isolation. Work with him and you will get more for the construction dollar.

An Approach—To Find a Trilateral Balance

It makes no difference whether you are planning a campus, an individual building, or a pen set for your desk, you still must deal with these three factors:

FUNCTION
FORM
COST

These three are inseparable and they must be dealt with simultaneously. And when this is done we are on sound ground for solving problems relating to a university. Our approach must be trilateral. According to the announcement of this conference, my job is to establish a relationship between form and function. Let me take care of that little item now. Look at my hand. It is designed to do certain jobs. It can pick up things, shape things, play some simple jazz on an upright, and pound on the table. It's quite a gadget—very functional. But can function be separated from its form? Of course not. Yet a recent questionnaire sent out by members of my profession to university presidents included a question which asked that *function, form* and *cost* be put in numerical order of importance. Bad question. It makes no difference which gets first billing. It's a trio. They all sing equally loud. Function, form and cost cannot be separated.

Even the great architect Frank Lloyd Wright misled some people in this respect in his "form follows function" axiom. Form does not follow function any more than function follows form. Form allows function. Actually it was not his fault because in his explanation of this axiom he clearly stated that form and function are inseparable.

Where does cost fit in? In this day, or any other day, cost cannot be ignored. It is one of the strongest forces for shaping buildings. I understand the architects of the Parthenon got in hot water when Minerva's temple cost too many drachmas. And I know no architect today who has not had to whittle after an unfortunate letting. There must be a harmonious union of these three inseparables and sometime opposites—function, form, and cost.

Let's now apply these three to the situation on the pasture. When we plan our campus and its buildings we must seek a trilateral balance. It's like setting up a tripod with function, form, and cost being the three legs. Usually we think of function first, and start pulling out that leg of the tripod. We talk about the philosophy of the university, the individual needs of the students, educational concepts, administrative structure, new teaching methods and devices, scheduling, counseling, research, services, operation, and maintenance. We talk about the efficiency of the flow of people and things. About the affinities of buildings. About the quality and quantity of space to do the educational job next year and the next 5, 10 and 20 years.

Then we start on the second leg of our tripod which we label as form. We try to answer the question: What form is best to respond to the function? And we talk about sizes, heights, and shapes of buildings, the best way to group buildings, circulation patterns of pedestrians and vehicles, land possibilities and limitations, relationship of campus to neighborhood, consideration of the climate which hovers over our pasture, natural as well as manmade assets and liabilities, and the concept of space, form, color, and texture. Actually, before we completely extend the two legs, we must manipulate the third leg of the tripod—cost—because we seek balance. In dealing with this major consideration we must discuss such items as cost control of construction, budgets and timetables, feasibility of abandoning or renovating old structures if we are dealing with an existing campus, cost of operation and maintenance, and land values. Cost as related here is more than a price tag because it concerns value received.

So now this brings us to our third theorem:

> THEOREM NO. 3: ONLY THROUGH A SIMULTANEOUS CONSIDERATION OF FUNCTION, FORM AND COST CAN A REALLY GOOD CAMPUS PLAN, COLLEGE BUILDING, OR PIECE OF EDUCATIONAL EQUIPMENT BE ACHIEVED.

Obviously if we limit our thinking to only function and form, we might have a most thoroughly programmed project and a beautifully conceived design, but if it cost too much to build, time and effort is wasted. Similarly, if we consider only function and cost and turn out big uglies, we are in just as bad shape. There are too many academic junk yards, now. And finally, if we consider only form and cost, we could have something that in some eyes—not mine—might be very beautiful and very cheap; but if it doesn't perform with educational efficiency, then we still have not a good campus, building, or equipment. Function, form and cost are inseparable and must be considered simultaneously.

As you probably have noted, I have used the first person plural—"we"—quite profusely. Strictly intentionally. To do these things, it takes the plural, not the singular. An architect cannot design a successful educational building by himself. Neither can an educator nor a faculty committee. Successful college buildings are created when good faculties and staff get together with good architects and engineers. The students have a great deal to contribute. The design of good colleges—buildings and grounds—is a team effort.

Design Premises

Now let's see where we are. We want to build a university or develop an old one. In the first case we have a pasture. In the second case we have an existing campus. We have developed three theorems to use as a basis for planning. They concern space, students, and an approach. It's a lot safer dealing with theorems than thumbing through the books and magazines to find something to copy. When you copy solutions, you copy some problems you usually don't have. Architecture for higher education is too important for administrators and their architect to be caught in the bottom of the cliché barrel fooling around with current fads. John Dozier, Business Manager of Duke University, and a client of ours, has this to say about the importance of the campus: "The vitality, imagination, and philosophy of a university can to some extent be measured by the concept of the campus master plan and the quality of the individual buildings." The importance of college buildings can't be underestimated. Another client, Dr. William Travis Jerome of Bowling Green State University, puts a different emphasis on the college plant's importance. He is convinced that a campus can be a teaching medium. "It should start students thinking about the proper design and function of architecture and develop an appreciation of trees, shrubs, art, and sculpture. Students ought to be moved by their surroundings in college to sharpen their own tastes and judgments in order to give them the background for shaping the expanding suburbs and metropolises where they will live and work." Planning college buildings and campuses is a great responsibility and deserves and requires all of the creativity and talent that can be mustered. Sound programming is a prelude to good design. The buildings and their grounds must stem from carefully formulated premises which will enhance the beauty and increase the effectiveness of the learning environment. There must be thinking before drawing. Most architectural sketches are premature. And they appear so final. And so pretty—pretty far from reality. Sometimes it is the architect's fault, but more often it is the fault of the university people who want pretty pictures. The pretty picture approach is out of the question.

Again, back to the pasture. Before we completely ruin it or make our present campus any worse than it is, there is another step we should take before hitting the drafting boards. It concerns the development of design premises, the theory behind the design. Now let's see if we can derive from the theorems design premises which not only will apply specifically to your campus but to your neighbors' as well.

> PREMISE NO. 1: THE CAMPUS AND EACH OF ITS BUILDINGS SHOULD BE PLANNED MORE FOR FLEXIBILITY THAN FOR EXACTITUDE.

Comments: A successful educational plant is organic. It must grow. If not, it must change. In this fast-moving educational world nothing stands still. Accordingly the physical plant must possess the quality of:

A. Expansibility
B. Convertibility
C. Versatility

Consider expansibility. When my firm was working on a development plan for Ohio State University, I happened by chance to read the minutes of one of the meetings of the Board of Trustees which was held a good number of years ago. At this meeting the trustees voted to limit the enrollment to 1500. This was of particular interest to me because I thought the current enrollment of 26,000 quite high. Our development plan therefore considered an enrollment of 50,000. Now we will not be surprised if enrollment reaches 100,000.

Consider convertibility. It is a good rule not to put a name on a building. If you do, you are in for some stone chiseling. I am sure each of you has better examples but there is a building on the campus of Texas A & M University which throughout its relatively short life was a school of veterinary medicine, a classroom building, a physics building, a library, a landscape architecture building, and an administration building. That's quite a range—from housing horses to housing administrators. But that is progress.

Now consider versatility. Money, the great form shaper, demands that many spaces have multi-use. A lounge must double as seminar space. A biology lecture room must also serve as a physics lecture room; a large lobby as an exhibit hall; and even the halls with study carrels are put to educational use.

These three: Expansibility, convertibility, and versatility, add up to the more general term, flexibility. "Form follows function" is not the key. Form must have flexibility. Form must allow function because in education it is inevitable that the function will change. Our buildings must conform effectively and economically to these changes. Where Wright preached exactitude, we must favor flexibility.

> PREMISE NO. 2: A UNIVERSITY OR COLLEGE IS MORE THAN THE SUM OF ITS PARTS. THE VARIOUS DEPARTMENTS, SCHOOLS, AND INSTITUTIONS WHICH FORM A UNIVERSITY MUST DO A BETTER JOB COLLECTIVELY THAN SEPARATELY. AND THE ARCHITECTURE MUST RESPOND TO THIS TASK.

Comments: A building is more than a collection of rooms; a campus is more than a collection of buildings. This concept belongs in the realm of Gestalt psychology. A gestalt is a whole whose characteristics are determined not by the characteristics of its individual elements, but by the internal nature of the whole. Some campuses rely only on the trees and grass to tie the buildings together to achieve wholeness. I might even venture to guess some administrative structures have about as much cohesiveness—not grass, but crass. Educational programs for specific departments cannot be planned in isolation, nor can the housing for those programs be planned in isolation. A university should have what the name implies—wholeness, educationally and architecturally. Each department or school must operate on the assumption that collectively it can do a better job than separately. And its buildings must be designed on the same premise.

We hear much of the interdisciplinary approach in education. We should hear more about the interdisciplinary approach to educational architecture. Buildings on a campus should speak to each other with understanding and sympathy. Some, however, thumb their noses at each other. One such building is Corbusier's Graphic Arts building at Harvard. As exciting and as skillfully conceived as it is, it was designed in complete isolation. On the other hand, Hugh Stubbins' Loeb Drama Center achieves functional and esthetic propriety with other important buildings on the Harvard campus. My firm is doing the new Graduate School of Education on the same campus. One of the design premises which we established from the very beginning was to have a building which would "dwell together in unity" with its neighbors. How did we achieve this? First, we decided to buck the current fad of the day—sculpturing in concrete. My partners and I put on our stiff, celluloid collars, pulled up our large leather chairs underneath the crystal chandeliers, and after reading a few choice quotations from Ralph Waldo Emerson, we decided to use the original Harvard brick. How indigenous can you get.

PREMISE NO. 3: A UNIVERSITY PLANT SHOULD REFLECT THE EXCITEMENT OF LEARNING WHICH CAN ONLY BE FOUND IN A PURE FORM OF DEMOCRACY.

Comments: Have you ever thought about the difference between a university and any other institution: Believe me, I have. This difference came to light most vividly three years ago when I was made Chairman of the Department of Architecture at Rice University. A hard-nose practitioner can very well get his nose bloody in that academic jungle. Although my firm at the time had more people than the number of students and professors I inherited, I found the administrative problems were tripled. Tenure, academic freedom, process by committee, approval by entire faculty—all of these things play Old Ned with administrative efficiency. But on the campus the professor is king. And that is the way it should be. We must have free thinking because more often we get "freedom from thought," as one of my Rice professors would say. The one place in the world for free thinking and democratic action should be on the university campus. Shouldn't this be reflected in the buildings and the grounds? For this reason a college should be different from a high school where the principal, not the teacher, is king. College buildings should portray the most advanced thinking. They should have a certain degree of independence, and yet be cognizant of the others. The spirit should be democracy, not anarchy. I am firmly convinced that buildings can have individuality, be generic, and yet belong to a system of order which assures architectural unity. Perhaps this is the real key to planning college buildings. When we delve deep enough we shall discover the uniqueness and subtle differences of campus architecture; why the campus cannot afford to have unimaginative, poor copies of buildings, old or new, which do not measure up to the integrity of a nearby filling station; why architecture for a university must represent the most advanced knowledge of learning; why it has to possess a mystery related to probing into the unknown.

The greatest buildings on earth should be on the campus. But they are not.

PREMISE NO. 4: THERE IS NO CRYSTALLIZED FORM FOR A UNIVERSITY ARCHITECTURE.

Comments: "Collegiate gothic" is fine for Duke, Washington University, or Yale, provided it is brought up to date as the cases may be; but it won't do everywhere. The residential character of Princeton is wonderful for Princeton, but not so good for Columbia. The high-rises of Ohio State do fine there, but not on the campus of Foothills College. So there it goes. But architects like to categorize things. They like to split their campuses into only two groups—the urban campus consisting of closely grouped buildings complete with paved plazas on the grand scale, and the suburban campus on which the buildings sit among the grass and trees. By inference the urban campus occurs in the city and the suburban campus in the suburbs. But this has no validity. As a matter of fact, we are planning a new college in Iowa located on farm land, but we are making it have an urban character—a sort of academic city in the country. On the other hand, we have worked on universities in a strictly urban situation where the campus is a park within a city. We like the contrast. In the urban campus situation it is much more difficult for three or four firms of architects to develop unity than if the same firms were working on a suburban campus which is difficult enough. The urban campuses require certain kinds of buildings that because of their character cannot stand alone. Architect José Sert designed this sort of building group for Boston University. The character of these buildings is such that their forms and textures would be out of place in large, landscaped sites with plenty of space between them. On the other hand, there are certain buildings that must be set in a green grass mat, particularly those with complete symmetry such as the ones by Minoru Yamasaki and Ed Stone.

Now let's get back to the pasture. Remember, it's the space above that has value. Just recently, school officials and their architects have discovered this simple fact. The thin air above is full of dollars. Today there is a trend to make use of this expensive air over the pasture. It is even the vogue to go up in the air. The increasing high cost of land no doubt helped set the pattern. But it started many years ago when New York University and Columbia University began to construct buildings of ten to twelve stories. And of course the University of Pittsburgh's famed 32-story "Cathedral of Learning" was built as far back as 1929. Now the feasibility of the high-rise of higher education comes up at every planning conference.

Ohio State on a suburban campus has had high-rise dorms for years. My own campus, Rice University, where a standard two and three story height has prevailed for years, will soon start a high-rise building. Is it wrong? Nothing is wrong if it is done right. There should be no crystallized form for a university architecture. Every campus has different problems. The organizations differ; the architectural forms differ. So what is constant? The only possible thing that can be constant is the approach to planning university buildings and grounds. Styles and fads decay with time. But the approach—and particularly the trilateral approach—flourishes with time.

PREMISE NO. 5: THE ARCHITECTURAL STRUCTURE MUST RESPOND TO THE EDUCATIONAL STRUCTURE.

Comments: We are back to the tripod relating to function, form, and cost. A university plant is the largest and the most expensive teaching machine there is. It has a job to do primary to helping the professor teach, and it should do it well. But the job will change from year to year. I might add, it should change from place to place; standardization of education can smother progress. It makes no sense for states to require every one of its institutions to conform to a common pattern which comprises a system of higher education. It is most encouraging to learn that Florida Atlantic University is able to break the set pattern and has embarked on a bold, fresh, and imaginative experimental program that is structured around independent study and self pacing for fulfilling degree requirements. Such an educational structure has tremendous architectural implications. Who knows—the library might well be larger than the fieldhouse. Of course, we don't call them libraries any more, do we? Is it now Learning Resources Centers? I can't keep up.

The trend towards individualized learning in this day is very strong. This seems to mean that the responsibility is being placed upon the individual student to achieve whatever learning is within his capablities and that the responsibility does not lie particularly with the instructor to impart knowledge to the student. This is rather dangerous thinking, but it goes back to one of the theorems which states that it is better to have an excellent student than to have a top-flight professor. But it is best to have both, and to have facilities that won't get in their way.

There is another trend tied closely to individualized learning which has great architectural implications. It has to do with the various media for teaching that recently have been invented and developed to further the independence of the learner. My crystal ball is too fuzzy for me to say that there will be electronic machines in every nook and corner of the university, or that there will be a lot of buildings designed specifically to house these machines. I still think the book is here to stay for a while and that the library will continue to be a place to house books, but it must be much, much more in order to be a place where all sorts of information can be dispersed to the students in a minimum amount of time.

And it seems reasonable to believe that the future will bring more special building types. The nuclear center is commonplace these days. When our firm designed one for Texas A & M University six years ago, we had never seen one before. What will the next ten years bring to the campus scene? An air-conditioned campus under a plastic dome? An underground city of learning? One 100-story highrise? As I grow older, I become less conservative. Sure this could happen. But what is much more important is what will be the educational structure.

PREMISE NO. 6: THE CAMPUS SHOULD HAVE A UNIFYING ELEMENT.

Comments: The trouble with discussing college or university plants is that they are hard to pin down. Some have two buildings on them—some have 80. Let's examine, for the moment, a unified campus with 30 or 40 buildings. There are many, many different building types and many kinds of architecture, but the campus has unity. Why? What overrides the buildings? Is the landscape strong enough to do it? Sometimes yes. In most cases, however, the thing that overrides the buildings is organized outside spaces—the outside rooms, the vistas, and the surprises around the corner. The most important element at Harvard is the Harvard Yard, not the buildings that form it. At Cornell the hills and the trees are the overriding elements. At Oklahoma State, the heights of the buildings, the common materials, and the distance between the buildings seem to be the overriding and unifying element. Sometimes age is the great unifier. Time blends stone and brick. Old trees and vines do also. Even soot pulls buildings together. I suspect if Harvard were stripped of its trees, vines and soot, the variety of shapes and forms in the buildings would be so disturbing no one would like to go to school there.

Let's stay with Harvard. Another thing which might give unity could be sheer "weight." There are all kinds of buildings at Harvard consisting of different forms and different materials. The common denominator might be their feeling of heaviness that helps pull them together. Even Corbusier's new building has this quality, although it might have overstepped the bounds of propriety.

Time pulls things together, but you can't depend upon time to help unify the campus if you are building a new campus or a new portion of an old one. A safe route to go to achieve unity without uniformity is to recall materials, building heights, and architectural forms, especially the roof forms. Still another way to achieve unity is through the establishment of a constant scale.

Scale is hard to define. Even architects can't communicate with each other when they speak of scale. I won't bore you with a long discussion on the subject of scale because even if I did, you wouldn't know what I was talking about. And I suspect I would not either. Nevertheless, let me try to tell you why most people like so-called collegiate Gothic, because it concerns scale. If you examine the details of buildings which are faithful to Gothic, you will see that it is based on the size of a man's hand. The human hand can span almost any unit of a Gothic building. Instead of having large columns of classic proportions, the columns—of which a cross section is just as large

—are broken up into smaller columns; small enough to nearly put your hand around them. Door and window openings are kept small. If large entrances are necessary, they are broken up into several small ones. This also explains why the Gothic style is appropriate to both a house and a cathedral. At Duke University where my firm was given a job to invent a new Gothic architecture that Duke could afford, we have relied heavily on pulling the campus together through a sensitive treatment of scale, in a like manner of original Gothic. Scale can be a unifying element. Scale concerns not only the details of buildings but the placement of buildings. Professional planners talk in terms of "pedestrian scale" and "automobile scale." We have found that when buildings are greater than one-half mile apart it ceases to have a pedestrian scale. The pedestrian scale helps to unify a campus. I teach on a beautiful campus, but it is a bit loosely jointed and has more of an automobile scale than pedestrian scale. It depends too much on the grass and trees to hold it together and not enough on clearly defined outdoor spaces. I really think that Rice would have a better campus if it were built on less land and its buildings formed well-defined outside rooms —quadrangles, plazas, or whatever you wish to call them. I also think that there would be an aura of more excitement if the buildings were closer together and the students had a better opportunity to mingle. Time, space organization, materials, heights of buildings and scale all help to unify a campus.

PREMISE NO. 7: EVERY CAMPUS NEEDS A SYMBOL.

Comments: Northwestern has its Lake Michigan, Cornell has its rolling hills that overlook Lake Cayuga. Wisconsin University, too, has its lake. MIT has the Charles River. Colorado University has its magnificent mountains as a backdrop. We built a college in western Colorado which has its own natural pedestal—a dramatic mesa. These God-given symbols do a better job than any man-made symbols can ever do. But man-made symbols also are necessary, particularly on our flat pasture. Texas University has its library tower, Washington University in St. Louis has its sallyport, and Duke has its magnificent chapel.

But these are more than symbols. They serve as unifying elements and give a certain visual order to the hodgepodge of buildings. Lakes, rivers, and mountains particularly give personality to the campuses. Unquestionably the campus planner should capitalize on the uniqueness of the natural environment. Only recently did Ohio State University discover the Olentangy River. The new development plans include the concept of a river campus. When the new buildings are built along the river, then OSU will have a new symbol.

Meanwhile, what is happening back on the pasture where there are no mountains, no lakes or rivers? This presents a real challenge to the architect. My advice: Get a good one. They cost no more. Dr. A. Whitney Griswold, the late President of Yale, liked to work with many architects, but only the best. He is credited with saying something like this: "We don't want one teacher or one architect at Yale. A great university should look at architecture as a way of expressing itself. It can do this only by choosing to use the very best architects of its generation—men who see history as a continuous stream, not a stagnant pool." I concur with this approach provided that the campus already has an established symbol or that one of the architects is specifically given the assignment to make one of the buildings a symbol with the understanding that the other architects must recognize this fact in such a way that their buildings are subservient to the symbol. Buildings should be smarter than people—not fight each other. Nor should architects of buildings.

PREMISE NO. 8: ZONING SHOULD NOT BE A SACRED COW.

Comments: The only thing I was certain of a few years ago was that each campus should be properly zoned. I firmly believed all of the academic buildings should be grouped together, all of the student activity buildings in another group, and all of the dormitory and dining halls still in a third group, and so on. Zoning was a sacred cow, to be left alone, undisturbed. The zoned approach was used for years by our firm with a feeling of security and even smugness. One of my partners made popular a planning device with a catchy name called "strip zones" which sounds too much like "strip joints." Strip zones for Central Christian College do not epitomize the highest state of propriety.

There is nothing wrong with zoned colleges. But is this the only solution for arranging the buildings? I hope not. One of the most exciting college projects we are working on is completely devoid of zones in the classical sense. If we must give it a title, we might call it "scrambled zoning." More than likely other college plans are based on the same concept because nothing is new, it seems. I don't know where the architects or the administrators got their inspiration, but I know where we got ours. It was from Jane Jacobs' book called "The Decline and the Rise of the American City." Mrs. Jacobs, who lives in Greenwich Village, likes the place and would like to see other cities be built that way, but because of zoning laws, she contends that it is impossible. Therefore, among other things, she advocates abolishing most of the zoning laws. Her real point is, however, that apartments, stores, and eating places should be grouped together for convenience, efficiency, and the stimulation of city life. And she points out that there is less crime in Greenwich Village than in Central Park primarily because with stores and residences right on the street, there is a certain amount of built-in supervision and protection. This makes a lot of sense to me, and it has direct application to campus planning. I know of at least four campuses which have the girls' dormitories zoned so far away from the middle of the campus that it becomes dangerous at night for the girls to walk to the library. Recently I heard a university administrator say that because the residential areas were located so far away from the classrooms, the loss of time going back and forth created an impossible situation as far as efficiency was concerned. So the expression, "Let's put the residence halls in a quiet, isolated area" which used to be so dear to me, today is not so precious.

This new college located in Iowa which employs the scrambled zoning technique consists mainly of one academic street designed like an old German town where people work, live and eat in buildings which line the street. The residential halls—like city apartments—are dispersed along this street. So are the dining halls, the classrooms, and at least for the time being, sections of the library. The academic street can be a most exciting place both during the day and night. It is a pedestrian street, by the way. Plans also call for including rentable spaces for commercial shops. This is urban planning in the truest sense.

PREMISE NO. 9: HAVE SOME PLACE ON THE CAMPUS ON WHICH CARS ARE NOT ALLOWED.

Comments: Many campuses are so large that cars have to be used to get from class to class. So I shall not say, "keep the cars off the campus." I will say, however, that there should be a no-car-land, and I would even go so far as to say that one shouldn't even be able to see cars from this place of no cars. If the university campus is too large for walking then there should be a campus within the campus which is designed for people—not automobiles. This not only eliminates the confusion of traffic, but also eliminates the noise of motors and the smell of exhaust fumes. Here are a few ways in which a pedestrian campus can be achieved.

- Have city traffic flow around rather than through the campus by creating a perimeter road around the campus as an outer belt.
- Bar automobiles from certain parts of the campus except for service or emergency use.
- Submerge busy streets to unify spaces and to help eliminate conflict of pedestrian and vehicular flow if city traffic must cross campus.
- Make parking the transition from vehicular to pedestrian flow.

The concept of the pedestrian campus is sound. At the rate thing are going, the university campus may have to be the last of the oases in our automobile-covered wasteland. Before the great architect Eero Saarinen died, he challenged his colleagues to build university campuses comparable to the monasteries of the Middle Ages to be the only beautiful, respectable pedestrian places left.

PREMISE NO. 10: EVERY BUILDING ON THE CAMPUS SHOULD BE GENERIC.

Comments: At this risk of a paradox, let me say that not only each building should be flexible, but each should have a certain generic quality. An engineering building should look, act, and feel like an engineering building—not like an embassy in India or a state capitol in North Carolina. A building for veterinary medicine for small animals should be what it is, not a twin of a building for humanities. A library is a library, but there are different kinds of libraries. So all libraries should not look or function alike, but they still should look like libraries. Nor should all science buildings be alike. Let me quote from a letter written by Dr. Louis T. Benezet when he was President of Colorado College: "How do I see this science building? I see it first of all as something to express science in the liberal arts college: clear, unequivocal, honest, forward-looking, imaginative and at the same time humble about its place in cosmic knowledge, which can only be expressed in terms of the philosophy of all knowledge working together. It should be the kind of building which attracts non-scientists: the greatest job of contemporary America is not to educate more scientists, but more intelligent scientists and more intelligent laymen who understand something about what science is. Our job will always be quantitatively more concerned with the non-science major, even though the science major will occupy the majority of space and time, week in and week out in the science building." That is one of the most useful and shortest educational specifications my firm ever received. Benezet spelled out in just a few words that he wanted not just a science building but one unique to Colorado College. I am sure he has no intention of transplanting a Colorado College building to the campus of Claremont. California is not Colorado. A building—to be a good one—should be indigenous, flexible, and generic.

PREMISE NO. 11: THE PROCESS OF LEARNING MUST ENCOMPASS MANY ACTIVITIES WHICH IF EFFECTIVE, BEAR RELATION TO THE INTELLIGENCE, THE MOTIVATION, AND THE STATE OF DEVELOPMENT OF THE LEARNER, AND TO THE PHYSICAL ENVIRONMENT OF THE LEARNING TASK.

Comments: The design of the physical environment of the learning task is more often neglected; yet science has established a close correlation between the amount of work done by people and where their work took place. For example, research has proven that the performance relating to a visual task increased as the lighting environment was improved. Visual acuity relates to visual comfort. The better the lighting the better opportunity for getting the job done, whether it is reading a book or doing an experiment in chemistry. It stands to reason, also, that a student sitting in an unbearably hot, stuffy room listening to his professor lecture on cryogenics wouldn't fare as well as if the lecture were held in a comfortable, air-conditioned space. And, if a student were in a seminar group which was discussing "The Silent Spring," and couldn't hear the discussion because of the automobile sounds coming through the window, he couldn't fully appreciate not hearing the birds. Yet most of the college buildings have been planned to impress people from the outside, not necessarily to provide comforts for the users. The beautifully proportioned and detailed buildings of Illinois Tech were planned for visual impact—not visual or thermal comfort.

But things are looking up. It was only a few years ago that college boards would approve air conditioning only for scientific instruments and a few chickens and animals. Now they do it for people. Most new college buildings either have air conditioning or plan for future air conditioning. If not, certain trustees need to go back to college .The interesting thing, however, because of the advent of air conditioning, is the fact that it has created problems that we never had before. Where there is a certain amount of audio privacy from one classroom to another because of the din of outside noises, (Professor Bob Newman of MIT calls that acoustical perfume) the closed windows of air-conditioned spaces eliminate this perfume, creating more disturbance from one classroom to another. The thermal environment was improved, but at the expense of the sonic environment. Air conditioning even affected lighting. In order to minimize the heat gains by having large windows which raise the illumination in the room, air conditioning brought about smaller windows which decreased natural illumination and created glare sources caused by the small windows. Slow transmission glass, however, has helped to solve this problem. What we are trying to do, I suppose, is to seek a balanced physical environment.

Closing Remarks

By now, no doubt, you are thinking that we should plow up the pasture and plant it in onions. Planning housing for higher education is no simple task. It is most challenging. It is difficult to produce an architecture for a university which expresses in no uncertain terms that it is tailored for higher education; that higher education is dynamic; and that a university is not a depository; that the most beautiful, most functional and most stimulating buildings on earth should be on the campus. Unfortunately some of the greatest fakes on earth—buildings and people—are in the universities. But that has to be, I suppose. Because a university should give people chances to express themselves freely, the good architects should also have this freedom. The campus should be an exciting place where many people want to get together, as well as a haven for the lone scholar who wants to probe deep without interference from others. There should be all kinds of spaces which respond to all kinds of activities. It should be a living campus in the truest sense.

Jasper Rose, one of my professors at Rice University, recently wrote *Camford Observed*, a book concerning ancient English Universities in the modern world. Let me quote from it.

> In some ways the physique of Oxford and Cambridge is the most important thing about them. It colours the lives of undergraduates and dons with pleasure and splendor, gives them a conscious sense of dignity, beauty and opulence. And it suffuses the memories of all who have ever been to them, whether for three years and a degree, or for a day trip and a cup of tea.

Selections from the Discussion

We've put carrels in halls, in classroom buildings, and, of course, we've put them in libraries, but also we put them in dormitories. For instance, one dormitory that we did—they had kind of monk-like quarters—they decided they couldn't study in their bedrooms—so we put the carrels out separately. As you people know, there are all kinds of theories on where the students should study, but we put them everyplace. I don't know the right place—but I think the most interesting case was where they were actually going to build a learning center—but they were going to be mostly carrels and they were going to rent them. Can't you see, this is the best thing since pay television—a nickel in and go bone up on your studies.

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They're anticipating an electronic carrel and we actually haven't one to show anyone—but the carrel is equipped with a little TV receiving unit and built-in teaching machines and this sort of thing.

There are two concepts: One is, let's put the faculty off far away as we can from the flow of people, particularly if they're students. Let's have a retreat. We even had one request to put the faculty away in the basement where they could get away and have privacy. Naturally they didn't want any windows. We also put faculty off into the attic in a remodeled building that we were doing at Harvard because they wanted to isolate them. Then the other concept is let's put the faculty right in the middle of things where they can't run away from the students—where they're right by their lab—if they have a lab—or right by their classroom—if they have a classroom. We have even considered the idea—we don't have plans for this yet—it seems to me Southern Illinois has—where they want professors to live on the campus with their offices in their houses, but they want the dormitories to be on the perimeter so when the students go to class, they'll go right by the faculty member's house—so he'll be on 24 hours call.

About working with teachers—we were doing a public school and we had a planning team to work with and the wonderful thing is the gym teacher was the one who was to plan the facilities for the English Department and the mathematics teacher for the gymnasium, etc. So we came up to planning the gymnasium and we talked about it one whole afternoon and the thing was all negative—well for Pete's sake, don't give us an old brick building that smells bad and has no light in it and one of these brick boxes, and, of course, this is very disturbing—that's all I had been doing—and so I was immediately on the defensive on this thing. So one of the teachers (it wasn't the gym teacher, it was the home-making teacher—I should have baked her a cake for saying this) said "Wouldn't it be nice if we could build an indoor play court as nice as any outdoor play court." What a concept! Back to the pasture again—this is when I first thought about this pasture—it's the same thing as designing that elephant. So we started out—we decided all we needed for a gymnasium was glass—we were all fired up then—it smelled good and the atmosphere would be wonderful—and then we started getting chicken. We thought the voters wouldn't like the idea. We figured it out—there was 15% of the time that it might be so cold that they couldn't run around fast enough to keep warm, so then we knew that the voters wouldn't buy that. We always underestimate people, though, so we decided to use glass, but have the umbrella large enough to keep the sun off the playing court and at the last minute the superintendent got a little chicken and said "I've got to present this to the board. Just let's put brick walls, right here and here and here." And I got a little scared too, so we put a brick wall there, not a big one, and fortunately some of the board members had seen us working on this and when we came up they said, "Now look here—a pretty strong concept you have here—we don't want any brick walls." So we got the most wonderful gymnasium that we ever did at a lower cost. We found some glass that you couldn't break and we put it at places where we thought it'd take a beating and the first year we paid $125 for glass breakage—it wasn't very much—of which $65 was done by the coach—he threw a baseball. It's a wonderful thing and this came about through this team approach—this planning—it wasn't our idea—but if we came up and said, "Board, let's build an all glass gymnasium, they would have thrown us out flat on our ears." This is a very wonderful thing and it came from working together with teachers.

We built a lot of high schools without any doors—just open space—in fact we have an elementary school going up in New York City where it fits under one big dome and there's 150 children and seven teachers in this one big space. This is taking the team idea of teaching and translating it directly into architecture and the funny thing about this is that these things work—if people want them to work, and that's why it's so important for the educators to be involved in the planning.

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But the trouble with having these carrels is that you could have more carrels than the student body, if you don't watch out. You have the duplication and they cost money and you have to make up your mind where's the best place for them to study.

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We should have buildings that would have the roof permanent and some of the outside walls permanent—but the inside just as fluid as you can get—really have malleable space—I believe that as we get into the industrialization of buildings—as we design erector sets—that we can add and take away—that maybe we'll be a little closer to this thing that we're talking about.

An educator can say "I have a flexible building" and it turns out he has a movable partition.

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There are no good removable partitions. The cheapest good removable partition is about $2.50 a square foot.

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We still should have removable partitions but the ones that will control sound are going to be very expensive.

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Buildings shouldn't vie against each other and architects shouldn't vie against each other.

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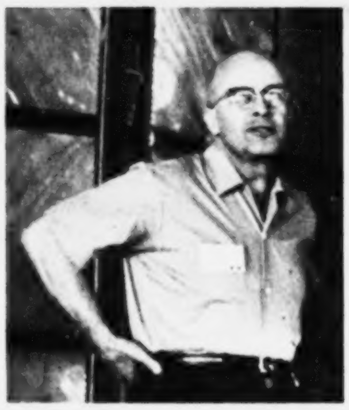

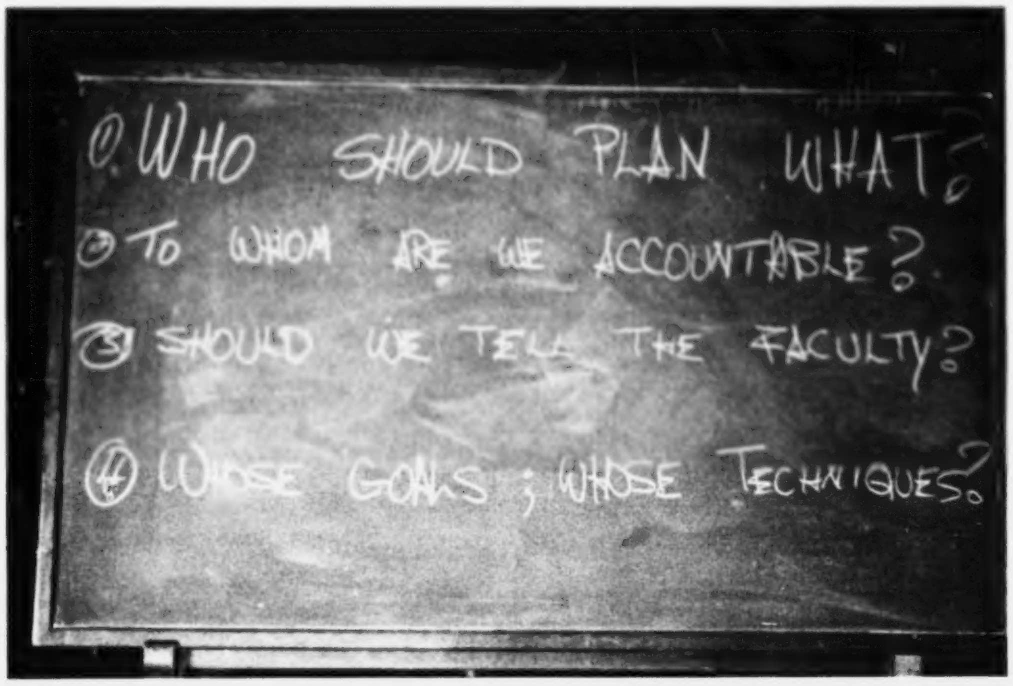

① WHO SHOULD PLAN WHAT?
② TO WHOM ARE WE ACCOUNTABLE?
③ SHOULD WE TELL THE FACULTY?
④ WHOSE GOALS ; WHOSE TECHNIQUES?

Long-Range Financial Planning

Kenneth M. Cuthbertson
Vice President for Finance
Stanford University

If we accept long-range planning in higher education, as we must or we wouldn't be together in this institute, certainly we will recognize the need for financial planning. The Rockefeller Brothers Fund reported in a study concerning the pursuit of excellence, "all the problems of the schools lead us back sooner or later to one basic problem—financing." Somehow, the hopes and aspirations of our educational leaders need to be put down in financial terms if we are to attract the resources necessary to accomplish the goals.

In preparing my remarks for this morning's session, I had originally intended to emphasize the "how-to" of long-range financial planning. I had thought it might be appropriate to outline the step-by-step methods of developing such long-range plans. This would have reviewed the basic steps of accumulating history, making assumptions, projecting the results of these assumptions and trends, and finally reviewing or testing results as a continuing process during the life of a plan. However, after reviewing much of the source material to which we at Stanford have referred from time to time and providing a bibliography for your use, I feel that there would be little advantage in my trying here to box the compass on the "how-to" approach. Anyone wanting guidance as to how to approach long-range financial planning for a university or college will find excellent counsel from a number of the books or articles listed in the bibliography. Particularly useful would be the McGraw-Hill study edited by Dexter Keezer, a copy of the Duke University case study, and the articles in *Liberal Education* magazine, March 1963, written by H. R. Bowen and Sidney G. Tickton. As a matter of fact, after reviewing this bibliography I asked myself seriously whether I should even be trying to give this talk.

As you can see, however, I was able to convince myself that perhaps there was something worth saying in addition to referring you to the texts; and my reasons are basically these. In the first place, we have done a lot of long-range financial planning at Stanford, and we take great liberties with the textbook approach; actually, some of our best financial planning has been done almost backwards. Secondly, by relating some of our own experiences, perhaps I can focus attention on some features of long-range financial planning worth emphasis. I hope by treating the material in this way that I might prompt some useful discussion in which we can engage ourselves following the presentation of my prepared remarks. I will therefore spend most of this initial time relating our own experience at Stanford and noting a number of features of long-range financial planning which we found particularly helpful or important.

Before going on with this, I would like to say by way of introduction that the whole question of long-range financial planning for colleges and universities seems to be a lively topic, and I think this is a good sign. Among the private institutions, one would have to give major credit to the Ford Foundation and the Foundation's Special Program in Education. As most of you know, this has been a program through which the foundation has made very large general support grants to selected institutions; and these grants have, at the request of the foundation, been based upon institutional studies which outline the institution's goals and financial needs. With respect to public tax-supported institutions, the interest in and practice of long-range financial planning are perhaps not so new (the University of California and Big Ten Universities' studies over the years have resulted in a quite sophisticated practice of long-range financial planning), but the interest has been heightened as the educational needs have taken a larger and larger proportion of the tax dollar and as legislative economists have been asking the question: "Where is this leading us?"

Also by way of introduction, I would like to say that although there are major differences in what the plans themselves will reveal as between public institutions and private institutions, I think the techniques of the planning and the features worth emphasis are not too different. The private institutions can and should preserve a greater degree of flexibility in their planning, but I would think this the only significant difference.

(Although I am not particularly satisfied with the terminology, I will use in this text the words "public" and "private" to distinguish between the primarily tax-supported and the primarily non-tax-supported institutions.)

Some Highlights of the Stanford Experience

Turning now to our experience at Stanford, I will try to outline this in a way which helps tell us why long-range financial planning is important and to some extent how it can be developed in practice and in a hurry.

A Felt Need.

In 1958 and 1959, the President of Stanford University was beginning to face some pretty tough questions from his trustees. All of these questions related to what the trustees considered an alarming rate of increase in expenditures. The mood was typified by the question at each annual presentation of the budget as to whether this million-dollar increase would continue forever. There had been, indeed, quite an increase in the level of expenditures at the university; fortunately, by stretching dollars and with some good luck, this had been managed without bankrupting the institution. Over the prior ten-year period, operating expenditures, excluding sponsored research, had gone up almost three times, tuition had increased from $600 to $1,005, and the annual level of gift support had gone from $2.4 million to almost $17 million. The president was caught between a trustee concern that we were going too fast and a faculty and student concern that we were not going fast enough. Stanford was in a position of having great opportunities to improve the quality of its activities; faculty recruiting was bringing increasingly able men to teach and conduct research, and our admissions pressure was such that the quality of the students was rapidly improving.

Feeling this squeeze intensely, the president asked himself and some of his principal university officers whether the financial momentum was likely to continue and whether we had not better begin to get an idea of its total magnitude. So began our first real efforts to get a better fix on our long-range financial problems.

The Initial Effort.

Because our initial objective was to convince the University's Board of Trustees of what we knew to be true, that continuing financial expenditure growth would be necessary, we decided to be conservative in our first efforts at financial forecasting. We elected to forecast our expenditures into the future on the basis of an absolute minimum schedule of improvements. Really, what we costed out in our first effort was a rather unacceptable future for the university in view of the opportunities which appeared to be present.

Because we felt it necessary to prepare some sort of long-term predictions in a hurry, we learned by our own experience that there are some great advantages in financial planning to start it with generalities rather than building from department-by-department analyses of specifics. We kept our effort at the top amongst the three or four men who were most familiar with the month-to-month and year-to-year financial problems and practices of the university. By analyzing the factors which affected our expenditures in the various categories, we forecast expenditure and income statements ahead for the ten years of the 1960's. We also indicated a minimum schedule of new plant additions and plant renovations. The most important factors affecting our financial predictions were the continuing increase in faculty and faculty salaries, and the recognition that we would have the opportunity and perhaps the obligation to increase our enrollment, particularly at the graduate level, increasing substantially the need for financial aid.

The needs for additional funds were compared with the anticipated increases from more or less predictable sources and the gaps computed. In this exercise, of course, two kinds of fund gaps were developed: one type involved an annual repeating need for operating dollars; the other pertained to capital funds, both for plant and endowment. In our case, we so computed our endowment need to provide that the proportion of operating income from endowment would remain approximately the same as the proportion of income from expendable gifts.

When this outline of the next ten years had been reviewed among the principal officers of the university and many of the assumptions and conclusions tested in part with various segments of the university, it was presented in an all-day session to members of the board of trustees, the presentation being in the form of justifying the basic assumptions rather than the exposure of financial work sheets. For instance, at this trustees' meeting there was first a discussion by two or three of the deans of the kinds of improvement needed in terms of additions to faculty and expansions of program; this was followed by the provost's analysis of the faculty salary situation nationally and at Stanford; absolute minimum plant needs for new space and renovation were then reviewed; the nature of enrollment growth, particularly at the graduate level, was explained. As each of these broad areas of assumption was presented and discussed, the trustees were asked to comment, and invariably their comment was to the effect that what was proposed was not good enough (or in other words, expensive enough) if Stanford was to meet its opportunities. However, when all of the basic assumptions had been explained and the dollar requirement was exposed—$150,000,000 in additional gifts over the ten-year period, there was a feeling best described as deep depression. But the trustees were somewhat encouraged when we recapitulated our financial history showing the unanticipated accomplishments of the past ten years.

Planning Pays Off.

It was nonetheless clear that to accomplish the goals just reviewed as absolutely minimum would require a new order of effort and an expanded point of view. This of course was the essential goal of the entire presentation ,and it justified the amount of long-range financial planning which had gone into it. I might say that those of us involved were looking for some satisfaction, because we had not provided for long-range planning as an activity in which the officers and particularly the controller and his staff were to be so heavily involved, and most of our work had been accomplished during the evenings and over weekends. (I'm afraid too much of this kind of long-look work is still being done on this basis.)

At any rate, having agreed at the end of this all-day session that there was indeed a big job ahead of us and that the financial projections were realistic in terms of need, the trustees asked for recommendations as to how we should attempt to meet this incredible increase in the level of gift support. It was within the following two weeks, while officers of the university were consulting with selected university volunteer leaders about how we might undertake to expand our gift program, that the president of the university was called upon by the officers of the Ford Foundation. It's rather amusing to recall the setting. These officers had asked to visit with the president and a few of his principal deans and other officers at the home of the president, where we might have an informal discussion; the foundation officers had not indicated the nature of their call, but because of their positions within the foundation, we had every reason to believe that it was a matter of some importance. When we finally settled down after the small talk, one of the foundation's officers said to the president that they had been giving some consideration to a program of large general support grants, and asked whether Stanford had done any thinking about where it wanted to be in the next ten years. You can imagine our smugness and their surprise when the president excused himself and came back in less than a minute with the copy of the presentation we had so recently made to the board of trustees. I doubt that long-range financial planning had ever been more timely!

Without any commitment but with some encouragement from the Ford Foundation staff, we developed more elaborate forecasting for the ten years of the 1960's. As a matter of fact, we experimented with a variable budget forecast for a ten-year period in order to demonstrate as a case study what the impact of a general support grant might be. Our three-level study was on the one extreme a projection of our minimum needs as outlined previously to the trustees, on the other extreme a forecast of operating and capital expenditures at what we defined as the fastest increasing rate at which we could spend money wisely in meeting objectives (and I might add that this was a good deal of fun to work on), and of course a third program which was pretty much in between these two and represented a substantial improvement over our minimum objectives but nothing quite so Utopian as the dream projections.

We have some reason to believe that the Stanford information encouraged the staff of the Ford Foundation to proceed with its program of special grants, and we were asked to assist the foundation officers in developing an outline of worksheets which they might use in seeking long-range planning information from universities and then, later, colleges whom they might consider for such grants. As I mentioned in my introductory remarks, the Ford Foundation through this program has had a salutary impact on long-range planning among private universities and colleges.

Following the foundation's commitment of $25 million to Stanford University over a five-year period, provided we could match this amount three to one from other gift sources excluding government, we refined our ten-year plans and selected from our needs those highest priority elements amounting to the $100 million goal. Actually, our ten-year requirements on this more hopeful basis called for $346 *million* in additional funds over our 1960 level, and of this amount we predicted at least $250 million would be required from gift sources. It has subsequently become most obvious that we were wise to reveal this larger level of need to our trustees and to much of our constituency prior to the $100 million gift campaign which was conducted under the name of the PACE Program. Now that we have succeeded in the $100 million campaign, we have a big job to remind people that this was only the highest priority group of expenditures in a program which will require well over twice as much in new gift funds for the full ten-year period. So our long-range financial planning had helped us immensely in indicating the magnitude of the financial problem ahead of us and in gaining acceptance for the large amounts needed; in addition, it helped us allocate to the highest priorities the initial $100 million gift target; and of course most important, it was directly responsible for encouraging the Ford Foundation in a program of this kind and attracting from it a very large measure of support to Stanford. The dramatic effect of this exercise in long-range financial planning was perhaps somewhat unique because of Stanford's position as a university whose opportunities for growth and improvement were tremendous at the particular time. There is no doubt in my mind that the advantages of long-range financial planning lie particularly in the laps of those institutions who are facing the potential of rapid change or improvement.

Comparing Notes With Other Private Institutions.

During the time that we were refining our long-range financial planning studies in 1960, I had the opportunity to visit twenty private institutions—eleven universities and nine colleges—which were among the leading schools in their respective regions of the country. The purpose of the visit was to compare notes on long-range financial planning with the principal financial officers of these institutions; and although there seemed to be a lively interest in long-range financial planning at the time, there was very little comprehensive work which had been done in this field. Among these schools the techniques were certainly not well developed, though the tough questions being asked by the Ford Foundation were beginning to stimulate a good deal of first-time long-range financial forecasting. The lack of long-range financial planning in this group of selected and respected schools could generally be attributed to the financial well-being and resourcefulness of most of the schools in the study. By and large, when they had needed additional funds they had been able to attract them.

I found that where long-range financial planning did exist it was generally for one of three reasons: 1) the school was experiencing unusual momentum in the growth of expenditures; 2) it was considering a major change in enrollment or curriculum; or 3) it was contemplating or conducting a capital fund-raising campaign.

During this study it appeared likely that there would be greater future activity in long-range financial planning due to a recognition that universities and colleges would have to sharpen decisions as to priorities in educational improvements. Among these institutions there was a pervasive feeling that much can and must be done in the continuing search for excellence and that this search would occupy the attention of the leading institutions in higher education. These schools recognized that the job could not all be done at once and that the pattern would likely be a survey or review of educational objectives followed by a line-by-line forecasting of expenditures and resources under varying assumptions over five to ten-year periods. To some extent this had been happening informally and by rough estimate, but it was clear that financial officers were gaining an appreciation that they would have to wrestle with the detailed predictions in order to improve the decision-making process.

Financial planning also clearly pointed to an increasing price for excellence. The best institutions were striving to become better, and they had some confidence in their ability to attract the resources necessary to finance what all could see as an increasing cost per student.

I was interested to learn that the universities in the study group had generally explored long-range financial planning to a greater extent than the colleges, particularly when it seemed that the colleges faced a relatively less complicated task. The universities had resorted to these efforts to a greater extent mostly because of the wider range of complex priority decisions they faced.

Some Important Features of Long-Range Financial Planning

Next, I should like to turn to some features of long-range financial planning which have seemed particularly important to us and perhaps are worth emphasis in this discussion.

Care to Avoid Overplanning.

The first and foremost is that one must be careful not to "overplan." It is, in our opinion, a mistake to think that we can plan in detail very far into the future in terms of dollars. I could get easily on to one of my favorite subjects which has more to do with university and college organization than it does with long-range planning, and I'll only say a few words about this because it bears on the way I think long-range financial planning might be accomplished. I tend to contrast the difference between a university organization and a business corporation by acknowledging in an oversimplified way that the organization of the latter—the business corporation—is like a pyramid with the president and principal officers on the top and the great number of workers on the bottom pretty much following the ideas, the instructions and what-not emanating from above. Contrasted with this is my idea of an appropriate university organization which is an inverse pyramid with the great number of faculty and students on top, any one or group of them really trying to develop ideas and improve the educational process in their own ways and in their own schools or departments; and coming down the inverse pyramid you have the principal officers and ultimately the president, who are really trying to serve the great numbers of people on top in the accomplishment of their functions. If one has this theory in mind, then it is apparent that any kind of long-range planning must provide flexibility so that a plan can be adapted or financial thinking can be accommodated to important moves which might be developed by the large group of faculty and, to some extent, students.

Colleges and universities cannot expect to do all things for all people, and therefore we have to be guided heavily by our opportunities to *build to strength*. This has been one of our president's principles in Stanford's recent dynamic history. We try to make our plans so that if we're able to attract unexpected strength in a particular field we can back up that strength to the fullest potential of the leadership and the additional support which that leadership may develop.

On the other hand, a somewhat opposite situation may occur when a plan calls for the strengthening of a particular field, but the institution is not able to attract the leadership which will develop the field in an excellent manner. If a financial plan is committed to expenditures for a program without adequate leadership, the likely result will be wasted money and a perpetuation of mediocrity. At Stanford we wait until we find the leadership, then spend the money and the success of this philosophy has been encouraging.

As part of this general observation of avoiding overplanning, I would like to mention that plans, if pressed to too great detail, may tend to be repressive, and thus a disservice to a university or a college. A very good idea for improving the educational process may be given no encouragement simply because it does not fit into the plan and the financial forecasts already made. It seems to me that financial planning must have sufficient flexibility to allow for the entrance of some new program even if an existing program has to be set aside. A case in point would be Stanford's experience in embarking on the overseas centers for our undergraduate students. I'm afraid that an overly-detailed financial plan might have canceled this program before it even got started. As it turned out, the first group of students and faculty was flying in a chartered plane to our first center near Stuttgart, Germany, six months after the idea was first suggested at a meeting of our faculty committee on general studies. The idea was so compelling and so suitable to our effort to improve general education and particularly to get rid of the sophomore academic slump that we simply had to figure ways to make financial reallocations so that the program could be undertaken.

In order to avoid the dangers of overplanning or planning in too much detail, we tend to keep our long-range financial planning on a university-wide basis without attempting to keep the school-by-school or department-by-department analyses up to date. Our university-wide financial plans tend to be expressed in the broadest line items of our expenditure and income statements, and the work sheets behind these statements tend to concentrate on those basic features which most affect the income projections and expense classifications.

On the expenditure side, we must keep in mind one rather unique feature of college and university expenditure, and that is the very high proportion of total expense which is in salaries. I quote Mr. Theodore Schultz (1963): "Schooling is more dependent upon the human factor than is production in the rest of the economy. In 1956, about 89% of the costs incurred for elementary and secondary schooling and for higher education are attributed to labor." Therefore, the factors we watch particularly are estimates of faculty-staff expansion, and faculty-staff salary and fringe benefit increases. In an institution which is growing or rapidly improving in quality, one is likely to have to pay particular attention to library acquisitions and to operations and maintenance of plant. The latter, of course, is related to a presumed schedule of plant expansion.

By keeping estimates for all these various factors on a university-wide basis (and checking our judgments by test analyses within schools and departments from time to time), we are able to get a fairly realistic projection for the university as a whole without attempting to say what variations might occur within schools and departments, since these depend upon factors which neither are nor should be subject to very good control. The translations from these factors of assumption into line-by-line predictions of expenditures for instruction, libraries, student services, general administration, staff benefits, plant operation, student aid, organized research, and auxiliary enterprises is not particularly difficult once one has set up the machinery.

Involving Principal Officers and Concentrating on Broad Plans.

The next most important general feature in our experience relates to involving top officers in the university in the financial planning process and indeed in *forcing* their major planning decisions. This is where I think we at Stanford, although not exactly abandoning the textbook approach, have certainly gone about our financial planning in a rather unorthodox manner. We think it would be very nice to undertake the kind of a plan which Duke University so beautifully accomplished and has so well reported in some of the bibliographical material I have mentioned. The University of Pennsylvania also did a magnificent "educational survey" which took over three years and involved an expenditure in excess of $700,000, as I recall. These two plans involved department-by-department analysis, school-by-school consideration as to objectives, how they would be reached, etc., and after all this academic planning and estimating was done, the financial people were asked to begin to apply dollar figures to these estimates.

We at Stanford for our own particular purposes see two dangers in the kind of approach used by Duke and Pennsylvania: In the first place, department-by-department planning could lead to a great deal of unfortunate disappointment. Desirable as it may be to have some free-swinging and open-ended expression of hopes and aspirations, to the extent that these are financially unfeasible in the near future or even within a ten-year period, they lead to bitter disappointments. As plans and hopes are put down on paper after thoughtful consideration, there tends to be a feeling among the faculty that they are so meritorious they will be accomplished. Sometimes, although meritorious, they may not be nearly as much so as other goals within the university, and the disappointment of not being able to proceed is heightened by this whole exercise. At least in a university which cannot afford to go ahead on all fronts at the maximum speed, we feel it is important to avoid this kind of aggravated disappointment. In the second place, planning in this manner takes a good deal of time and does not allow the kind of flexibility and the realism about changes in program which we find occur. By the time one does a three-year study to come up with some financial plans, it's quite likely that many of the individual department plans are no longer realistic.

Therefore, we believe that it is important to concentrate overall planning and estimating at the highest level among administrative officers in order more quickly to proceed with the job of getting financial plans in some kind of generally definitive shape. Our experience has been that the best process involves the vice president for finance and the controller and his immediate staff making their best estimates as to the basic assumptions, and blocking out a general forecast into the future for the various major expenditures and income sources. This first estimate, then, is presented to the principal academic and operating officers with the request that they try to correct us where we are wrong. This may appear to be a rather arbitrary forcing of planning decisions, admittedly, but we find that it works very well. It also has the advantage of requiring the academic and operating officers to have in mind the dollar magnitude of some of their thinking as they do it. It forces a conscious ranking of plans by priority.

I don't mean to imply that the vice president for finance and the controller must come up with some dollar figures and make everybody else fit their plans into them. Our figures quite often are adjusted in very significant ways. But the practice of getting something down on paper as a means to force decisions is of overriding significance in our long-range planning. It has been important to us that this be done at a very high level. We don't have a department of institutional planning; and if we did, I would keep it very small and have it quite sensitive to the principal university officers. The kind of forcing of decisions that we get out of putting something down on paper would not be very effective if it were done by relatively junior technicians, however important this kind of talent might be in some phase of the long-range financial planning effort.

Who Participates?

The question of who really should be involved in long-range financial planning is difficult to answer, and I suppose the best answer is: everybody. But you can tell from the comments I have just made that is has seemed to us that the leadership should be taken by the principal officers of the university, and by this I mean those closest to the president. I think that the principal financial officer should take the leadership in forcing those decisions which will have the major impact on financial planning, that the principal academic officer has the greatest responsibility for testing and ultimately agreeing for planning purposes to the most important factors, and the principal operating or service officer must be involved in an analysis of what it's likely to cost to serve the enrollments and academic programs contemplated. Once temporary conclusions are reached by this group of officers, it seems to me that they must be reviewed pretty much in total with the governing board of the university or college so that there is understanding and sympathy—and since the plan usually involves a tremendous increase in income, a feeling of some responsibility to see that the income is obtained.

Some might argue that the governing board should participate in the planning process; I disagree. While I think the board should have the opportunity to suggest changes in plans based upon its review, I think the initiative must rest with the president and his principal officers. The review of plans with deans of schools and the faculties, I think, should take a different form; and although the principal academic officers, including the deans of schools, ought to be acquainted with the overall plan in its summary form, I do not think that it is either important or advisable that they be exposed to all the assumptions which went into the plan. Actually, I think it is better if they are not, lest they think that such things as faculty expansion and faculty salaries will be increased across the board on the basis of the assumptions used in the overall planning. Rather, I think the plan and its assumptions should be kept in mind by the principal academic officer in his discussions with the deans and through them with the department heads as to the reasonableness of individual plans which must always be evolving and changing in academic programs.

Although I believe that individual departments and schools should be actively planning both short and long range all the time, I think it's important to avoid a direct tie-in between this kind of planning and the overall institutional long-range financial planning with which we are concerned. I am not particularly worried by the circumstance that all the departmental plans and hopes might not fit into the institution-wide plan; as a matter of fact, the smaller the units for planning, the less likely are they able to predict with any accuracy the timing of changes or improvements they would like to make. I suspect that the greatest difference between the sum of the departmental plans, if indeed they existed for every department, and the plan for the university as a whole would be in the timing. Certainly the sum of the departmental plans would involve under their most hopeful circumstances a much greater increase in expenditure over a shorter period in time than the institution as a whole could possibly accept as a realistic plan. But the academic deans and the principal academic officer of the university would recognize that not all departmental plans could be activated at the same time and that a selection of priorities would be imperative and would also be controlled to some extent by the availability of leadership to which I referred earlier.

How Long a Plan?

Turning to another question, we might ask: "How long is good long-range financial planning?" Based upon our experience of attempting to keep our financial planning in broad categories and descriptions, we find that it is worth an effort to try to plan ten years into the future; but we find that only for about five to six years of these ten do we have much confidence in our ability to predict. And only for this shorter period can we very well reconcile our institution-wide financial planning with our more detailed plans for the schools and departments. This has resulted in our concentrating our general budgeting work on relating the past five years to the next five years, and simply keeping for general background information the continuing projections beyond the next five into the subsequent five years. Now, it may be that publicly-supported institutions might well consider planning much more than ten years into the future, particularly where enrollments are less subject to control and where a longer-range magnitude of the financial impact might be important to legislative or political considerations. For instance, I think it was quite appropriate that the Master Plan Survey in California considered a period of some fifteen years into the future in the financial forecasting and planning that was involved in that study. But in our work at Stanford, we see no particular advantage in trying to put together plans for more than ten years into the future, and as I say, we tend to think of the second five of that ten as a somewhat nebulous though helpful guide.

Referring again to this five-year forward, five-year back period, I might indicate how this has helped us in our year-to-year budgeting. Since we've become involved in some longer-range financial planning, we present our budget each year to our board of trustees in the context of a ten-year period. We show the actual experience for the last five years including the current year, and then the budget year which is up for approval as the first of a five-year period into the future. Showing the budget in this context has helped the president and the board of trustees to concentrate on the larger picture and also has helped to meet that question that I referred to earlier, "Why must the budget go up a million dollars each year?" (Of course it's going up much more than a million dollars each year now, and the trustees understand why.)

Income: Tuition, Fees, Gifts.

A few words about the income side of financial planning—and here I'm sure the word "forecasting" is a much better one. I've referred to the question of tuition and fees, and recommend that we keep our eye on the national situation. Among the private institutions, we find it important to watch each other because essentially we seem to be pretty much controlled by what the traffic will bear. We find it hard to believe some of the figures we come up with when we project tuition rates ten years into the future, but I'm sure we wouldn't have believed our present rates had we projected them ten years ago.

I do not intend to get into the argument of whether public institutions should be charging tuition for their in-state students, but I will say that I think they will be continually forced to consider it—at least those which intend to seek the highest degree of excellence in their programs.

Of importance to the analysis of tuition as a source of income on a long-range basis is the theory most eloquently advanced by Seymour Harris, the Harvard economist, that the cost to the student and his family of the student's college or university education must be looked at more as something which should be spread over a period of time and not met from annual income simply during the time the student is in school. I think that we're seeing some evidence that this theory is gaining acceptance, and I suspect that borrowing will continue to become a more important factor in support of tuition, fees and other costs, this borrowing to be not only by the student himself, but also by his family.

For private and some public institutions, the next most important sources to estimate are expendable gifts, the income on endowment gifts, and the estimated growth of endowments. This is an incredibly difficult area in which to make any reasonable predictions or forecasts, but we have found that it is tremendously helpful in encouraging the effort necessary to attract gifts that we make our long-range needs known and that we expose the magnitude of the expectations. Here again, at Stanford we take some comfort from looking back ten years to see how far we've come when we project ten years into the future. In making our projections of gift income available, we tend to rely initially on the estimates of our staff and principal volunteers engaged in the fund-raising effort. Invariably these are not optimistic enough to meet our needs, and we show the difference between our total expenditures and our estimated income as a gap which is, essentially, a big carrot out in front of the fund-raiser's nose. Without going into the details of forecasting of gift results and why we think we will continue to see an increase in this area, I will say that we believe that the opportunities for substantial increases lie primarily in gifts from individuals and from foundations. One of the most hopeful possibilities is that there will be an increasing recognition of the validity of giving capital for use by higher education both for plant and for endowment, and that we will see more of a transfer of this capital from individuals to universities and colleges. I think this is something that we have by our recent efforts begun to stimulate here in the West to a greater extent. Capital giving has been much more traditional in the older areas of the United States, principally New England and the East Coast. Wealth in the West has tended to be thought of as newer and less stable and therefore not quite so subject to transfer. Those of us recently involved in capital fund-raising have been plowing new ground in the West, and we hope that maybe we are making some progress.

One of the knotty problems in projecting income from gifts or from endowment is the question of the extent to which one should rely on endowment. There's no doubt that endowment income is an important element in the security of an institution and in enabling it to plan with assurance and to roll with the punches. At Stanford, for the moment, our long-range financial planning has been done on a basis that we attempt to attract sufficient endowment to see that our reliance on endowment income is about proportionate to our reliance on expendable gifts; and just recently we have begun to try to forecast the need for increasing the relative reliance on endowment in the period starting six to seven years into the future. Our situation is perhaps unique because we find that we need to emphasize gifts of capital for plant at this particular time and probably for the next seven to ten years; and after that, we hope to put a greater emphasis on endowment in order to give a better financial base to everything we're doing.

With respect to both the tuition and fees predictions and the gift predictions, we find it extremely important to keep in touch with the national scene, particularly with income tax developments. We attach extraordinary importance to the tax provisions which encourage philanthropy toward higher education; this, in our view, is much more essential than some of what we consider the rather short-sighted proposals to afford some favorable tax consideration to tuition payments.

Borrowing.

Looking at financial resources in our long-range planning, we have been willing also to take a rather unorthodox point of view as to whether universities and colleges should borrow to meet capital needs. In the study I made in 1960 among twenty private institutions around the country, I found very little enthusiasm for borrowing, with the exception of borrowing directly related to dormitories or married student housing as encouraged under the HHFA program. There were less than a handful of institutions who seemed willing to consider seriously the possibility of borrowing for non-income-producing or non-self-liquidating activities. I don't know whether we're going to see a development of long-range funding through debt for basic academic plant, for instance, but I do contend that it is worth considering before one sacrifices too severly academic opportunities which otherwise cannot be accomplished.

Sponsored Research.

One of the most difficult items—both as to income and expenditure—to build into financial planning is sponsored research. We have treated this element, from a control point of view, in two ways. On one hand, in our overall presentations, we make some general estimate of the volume of such research, but we tend to be fairly conservative as to how much this might increase. On the other hand, in looking at all of our other elements, we tend to exclude the impact of sponsored research on the assumption that we will not accept the research unless it brings sufficient income at least to cover the incremental costs and hopefully to make some contribution to shared costs. With respect to the contribution to shared costs, we treat this as not available to meet our basic planned increases in expenditures but as available to do something more than we otherwise could have done.

Importance of a Planning Framework.

Another general feature of long-range financial planning which I think worthy of emphasis is the necessity to have a matrix or framework (mostly a combination of work sheets) covering not only the major classifications of expenditure and income but also the assumption areas that support those statements—a framework which is kept relatively up-to-date and into which the impact of significant changes can be plugged, if you will. If this framework can be kept simple, it can be a tremendously valuable tool for testing the effect of specific and dynamic changes in factors which must be considered.

Some Dangers and Traps in Long-Range Financial Planning.

It might be worth considering at this time what we might call some of the "booby traps" to watch for in long-range financial planning. Obviously I can't attempt to be comprehensive in this review, but I would like to mention some rather specific danger signals which have developed from our experience.

Rising Cost Per Unit.

To start with, I want to re-emphasize something I said earlier—that if an institution is attempting to improve the quality of its program (and I think we all are or ought to be), then it must be prepared to recognize in financial planning that the cost-per-student or the cost-per-unit, or however else we may measure it, is going to increase. I think this is terribly important to keep in mind in our planning, and I'm afraid that some of the public universities and colleges have been unwilling to face up to this in their long-range presentations. Personally, I was disappointed that the California Master Plan Survey did not hit this harder but simply indicated from an historical analysis that one might expect some increasing cost-per-unit in the future. It seems to me that universities and colleges as a whole will tend to follow the lead of the most outstanding institutions and that the total cost of higher education will increase at a factor very much greater than the enrollment growth. We can see that this has happened in recent years; I estimate that during the 1950's the overall cost per student in colleges and universities (on a constant dollar basis) rose at more than twice the rate of the increase in gross national product per capita. So in recognizing this increasing cost-per-student factor, I think we also have to appreciate that it will bring pressure for a substantially increasing allocation of our gross national product to higher education in the future. Just as Stanford's board of trustees, prior to the careful review of long-range financial planning, was somewhat unsympathetic to increasing costs, so I believe society in general (and as it is represented in the nation's legislatures) is similarly unacquainted with the future needs and is probably similarly unsympathetic. I don't think that society will respond to the need until our long-range financial planning puts it down in forecasted figures which can be supported by analysis and history.

"Self-supporting" Auxiliary Programs.

Somewhat related is the trap of assuming that certain programs which are currently self-supporting will continue to be so. Here, for example, I refer to residence halls and dining operations, student unions, intercollegiate athletic programs, and a university press. As the quality of an institution's programs increases, it is entirely likely that the quality of these so-called auxiliary enterprises may also have to increase and that in the process they will no longer be self-supporting.

Doubling-up Costs.

Another trap is to fail to recognize that in an effort to strengthen a department of a school or a whole area of faculty activity one might very well become involved in a doubling up of costs caused by the fact that the strengthening may involve a temporary overexpansion in that segment. This can result from the need to carry "dead wood" tenure faculty (if I can with due apologies use that expression) at the same time that a stronger faculty leadership is being attracted and encouraged, in turn to bring new additions to the faculty. I suspect that very often this kind of "doubling up" in a particular department or area is the only solution. At least we must measure the full effect of it and be able to apply the financial resources to it or else back away from the improvement and simply wait out the tenure retirements in order to go ahead. I might say that having calculated the costs of these alternatives, at Stanford we have done it both ways—in some cases accepting the extraordinary costs in plowing ahead, and in other cases playing the waiting game and simply accepting a continuation of mediocrity or even deterioration in a field in order to wait until we could conserve enough billets from retirement to begin again with new leadership.

Salary Costs.

Another group of booby traps involves predictions of the salary levels, both for faculty and non-faculty. Academic salary levels are in a period of momentum nationally, and an institution which is lagging behind but intends to catch up must be aware that the competitive levels it is trying to reach will also continue to increase.

A potential danger is to fail to recognize that there may be local circumstances affecting the increasing cost of non-academic personnel—that is, the need for a rising wage and salary level for these people. We at Stanford, for instance, have learned that the rapid development of professional and industrial activity on the Mid-Peninsula has kept a steady and mounting pressure on increasing salary ranges. It has also had the other effect of providing a greater total source of clerical and administrative talent as the population has increased; but in order to get the best from this talent pool, we have had to make some very substantial re-evaluations of our wage and salary costs.

Another factor frequently ignored in salary predicting is the nation-wide rise in the standard of living. Too often we fail to recognize that for the personnel we're employing we have to face not only the rising *cost* of living but a rising *standard* of living, which means that the cost indices alone are an insufficient measure of what it's likely we're going to have to pay.

Construction Costs.

If an institution is contemplating a good deal of construction or expansion of space in its long-range financial planning, it will simply have to recognize the trend of construction costs with which it is dealing—not only the national trend, but the local one as well. We know this only too well at Stanford, for the actual costs in our particular area have increased far more than could have been predicted on the evidence available to us at the time we were making our forecasts.

In addition, one must make the painful analysis of the total complex of plant service facilities, particularly if we have to finance them ourselves. The financing of utilities, roads, and parking presents a real problem at Stanford, since we provide most of these facilities ourselves and also because these are the most difficult kinds of projects for which to attract gift funds.

Administrative Costs.

An institution which is rapidly changing also must watch out for the booby trap of neglecting realistic estimates of increasing administrative and general expense costs. From limited observations, it has seemed to me that however much we may hope and wish to keep administrative costs at a minimum, an institution cannot change rapidly in its character or in the level of its quality without investing a great deal of expenditure in administrative effort. Perhaps I don't have to dwell on this with this group, but I would like to give you the courage to face up to it. By all means be prepared to explain to the faculty or to your governing board that while it is very inexpensive to administer or provide the administrative services for an institution which is standing still, it simply doesn't work that way for one "on the move."

Enrollments.

To complete my suggestion of potential booby traps, I might cite a common one with respect to enrollment predictions. The trap is to assume that enrollments will depend upon an inflow of students and that with a given inflow one can predict a particular enrollment. I'm sure that our experience at Stanford is shared by most others. In connection with undergraduates, there is progressively less attrition, so that a given input at the freshman year is tending to result in an increasingly larger total undergraduate student body; more are staying to complete their work for a degree. There is also a little counter-effect taking place which is worth noting; this is that some students are pushing through at a very rapid rate compared to the usual pattern and may be completing in three or three-and-a-half years.

At the graduate level, universities will experience, I think, a remarkable change which tends to increase enrollment more than we would ordinarily expect. This is the change due to a much larger percentage of graduate students seeking the Ph.D. degree. Over a recent period at Stanford, only about half of our increase in graduate enrollment was due to increases in the number of entering students; the other half was due to the lengthening out of the time an average student was staying.

While on the subject of enrollment, I guess I might simply throw out one further alarm signal, having to do with *postdoctoral* activity; this is that post-doctoral fellows or whatever else you want to call them are increasing in number, are difficult to count, and expensive to educate. We had better not neglect them in our long-range financial planning.

Conclusion

In concluding, I would simply like to reaffirm what I obviously believe, that is the importance of long-range financial planning in pointing up the big issues with which the program planning of an institution should be involved. I think there is nothing like some forecasted dollars, particularly some enormous potential deficits, to sharpen up thinking as to what are the highest priority moves which colleges and universities must make. I believe that some of the innovations in our education will result from the kind of thinking which is forced by the long-range financial planning.

Some of the kinds of issues of which I'm speaking are the question of whether we really should plan on an increasing cost-per-student and therefore look at the larger problem of how we undertake to convince society that a larger proportion of the gross national product needs to be allocated for higher education. Another issue is the continuing one of the humanities versus the sciences. Always we have the issue of quality versus quantity. At a particular time in an institution's development it may have the issue of plant versus people.

Other issues forced by such long-range financial planning have to do with year-round activity versus the traditional nine months, the kind of students we want, and whether in order to attract students on ability alone one is able to predict that financial aid will be available to finance those who need it. While these important issues perhaps would be met without the crutch of financial planning, it seems to me that in our experience at Stanford we've wrestled harder and more intelligently with them when we had some idea of the financial consequences and the financial trials which we could anticipate as the result of some long-range looks.

Much as I am committed to the value of long-range financial planning, I would not say that all institutions should find it so important. I am reminded of my experience in 1960 when visiting some of the most outstanding privately supported institutions in the country and finding a wonderful confidence that they could attract the necessary financial resources as and when they needed them, and therefore any concerted effort for long-range financial planning did not seem particularly necessary. Frankly, I think we'll all be well served if there are some outstanding and well-financed institutions in the country which don't have to be so concerned about long-range financial planning and can spell out developments to be undertaken without such rigorous pre-study. Certainly long-range financial planning is no guarantee of excellence, and an excellent institution does not necessarily need a long-range financial plan.

However, in addition to helping to point up the big issues, there is a tremendous value in long-range financial planning, for both the public and private institutions, in order to make a strong case to their constituencies so that they may attract the long-range financial support, whether it be through legislative resources or voluntary philanthropy, which certainly will be called on. Sidney Tickton in an article in the *Saturday Review* in 1962, when talking about the advantages of long-range financial planning, said that "to be strong a private college must have a strong constituency—national or local, religious or non-sectarian—which believes in a mission to be accomplished and is willing to back that mission with its money." This is equally true for universities, and I predict it will continue so for both the public and the private institutions. And since most of the people who control decisions with respect to making of gifts or allocations of funds are accustomed to asking for and receiving some evidence of plans, I think we're going to be doing a good deal of long-range financial planning for some time to come.

Selections from the Discussion

Corporations have come a long way, I think, in voluntary support; incidentally I'm talking about private gift support, you understand, and I think that corporations will increase their giving.

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It's a little difficult for me to think that in terms of gifts for higher education the corporations are going to do anything as dramatic as can happen to individual wealth and to foundations. We think that whereas in corporations over the next ten to twenty years we may double or triple the amount of support, the potential of support from individuals and from philanthropic organizations for higher education is far in excess of three times. I mean there's more to be given away in the hands of individuals in the foundations being formed by individuals, or in some cases by corporations, than there is by corporations themselves. I think an increasing amount of gift support has got to break through the barrier of gifts of income and gifts of capital. You see, corporations are limited essentially to gifts from income, and if individuals and oak leaf foundations begin to give some of their principal away in greater amounts, we just think the potential is greater there.

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We on the staff at Stanford take the point of view that one of our great assets is credit. Why should we suffer academic deficiency without using one of our available assets? But this idea doesn't apply much higher in the organization—the president is for this I think. The board of trustees is just not interested.

◆

I feel there is a very great resistance on the part of the people who feel a trust responsibility to using credit in higher education and I think it's going to take a lot of time and effort to get on with this possibility of using debt, but we'd love to have company, love to have a lot of others around the country doing this.

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I think it's a wonderful thing that graduates of publicly supported universities feel that they want to help higher education and their loyalty has been so strong to their own school that they will make gifts to it in order to allow that school to do a better job than it otherwise would, and I don't see why we on the private side should discourage this.

◆

How large should an endowment be? I'd like to see about 30% of our income from endowments. The only reason I say 30% is because I don't know of a better percentage. Jesse Hobson makes a very good point—in a way one can look at this kind of capital tied up in endowments as being unproductive. I think—and this is a little dangerous for a financial officer to say—I think that given the mass communications involving mass hysteria that can occur in this country that there can be very real and perhaps lasting challenges made to important teachers of higher education, and I pray there are a number of institutions that are sufficiently independent of their annual support, whether it's legislative or philanthropic, to carry us through some of these periods and speak boldly. This in my mind is the basic reason why an individual institution has got to have something it can rely on that will allow it to go against what might be a very pervading criticism. You might not be able to get enough students or students who can pay the tuition, or your gift sources may dry up over a period of time, and this is my reason for thinking that some endowment is necessary. I hope we never have to rely on it in that way, but I hope it's there to rely on if we have to and I think it's important that the private schools be able to do this because the public schools could have their legislative support cut off in one way or another.

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The pattern often seems to be that your application is for half of the research space you need; they then give you half of what you ask, so you get a quarter of what you really need.

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We've got really an inadequate amount of space for the program that we're running and part of it is due to the fact that going ahead in the applications stage people will say "Well, we'll make do somehow," but once they get going it's a little painful.

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I think the input of federal funds has led to the production of new knowledge—and I think in a way it's unfair to say this is for the university's benefit . . . it is for the benefit of scholarship generally. What the faculty is trying to do is to produce new knowledge for the benefit of everybody.

The points we try to make in our financial planning are these—that in the first place we exercise very careful academic control of applications for grants and contracts. Coming in to university work as I did ten years ago and examining this situation, I thought this existed everywhere, but I find that's not true. We have our experts too and there are lots of times we find out that somebody on the faculty has gone a little too far with the granting agency—but the Stanford tradition has been very admirable, I think, and these issues are faced up to first in the department and at the deans' level, and then by the provost to the graduate deans by way of a review of all these applications. An officer on the comptroller's staff has a final look at these things. Another thing is the fact that the federal government is a myriad of granting agencies. I shudder when I think about this talk in Congress about how we ought to total all this up and see where it's going and come up with regional quotas. The other thing that we do is try to point out that in using these grants financially that we are at least covering our incremental costs. One other thing too—the dollars in a lot of this research are not meaningful in terms of program. Suppose we are going to pay a million dollars a year for power on the linear accelerator. To compare a million dollars of that kind with million dollars in fine arts is ridiculous. We'd like to try to get away from the dollar part because a lot of that is clerical and many other things. The little bit of research in physics costs a whole lot of money. We try to point out the differences, although when we have to look at dollars we try to point out the inadequacy in comparing dollars.

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About the private universities seeking public support at the national level, it seems to me that so far what has been thought is not so much general support but money for opportunities to do things which the school thinks it can do well, research mainly. I don't see how we could have had the growth in research we've had without federal support and I don't see how this could have been done without it going to private institutions, where there were people who could do this, and do it better in individual cases than people who might be in a different kind of an institution. So I assume the federal thing is not too much of an issue.

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I think a little amount of private support to public institutions is going to do what I was talking about earlier—it's going to carry through the tough water once in a while.

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What's the trend in the percentage of our operating costs met by tuition and fees? It's been 40 and 45% —when you take off all the self-supporting activities.

At the state level I tend to think that except for support that would go to students in terms of scholarship aid or fellowship aid in order to help overcome this deficiency of financial ability where brains may exist, I'm not so sure I think it's a fairly good thing for the privately supported institutions to be asking for help. I can hardly think of the state which isn't going to be hard pressed to meet its needs to support the public institutions and I think the private institutions had better get their support elsewhere in terms of general support, but I do see an advantage both to the state and to the private institutions of some pretty broadly based solution to the program such as we have in our state and if this could be expanded to a fellowship program I think this would be very good. And I think this is justifiable. It is not really financial aid to the private institutions but it is an aid really in allowing it to attract some students who might best benefit by the particular program at that school who otherwise might not be able to do it. This gets a little sensitive because I think that some of the state-supported institutions feel that the state funds are being used to "divert some of the best students to private institutions." I think this is limited. I think what it's doing quite frankly is keeping some of these best students in our state instead of letting them go off to Harvard and Yale.

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I think the formula that has been most successful is the formula in which the publicly supported schools concentrate their aggressive efforts with their own alumni and deal with those who are not alumni and others who might be interested in supporting more on a basis of at least making it easy for those people who support it, but not being aggressive. I think that there are real dangers which I'm sure that the public instituions see in becoming overly aggressive in seeking private support from individuals, coporations, foundations and those who are not otherwise directly involved in the school. I think in doing this enough toes would be stepped on that ultimately legislative pressures get at work.

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We used to say we would increase tuition once every four years. Now we do it once every two years in lesser amounts. I can't tell you whether this is by design or not, but there's no question that every time we recommend an increase in tuition we take a look at tuition and if it hasn't changed too much we say so.

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If a public institution feels that if it needs to augment its publicly received funds by private resources and it can tell a story which attracts those funds, within reason they ought to do it.

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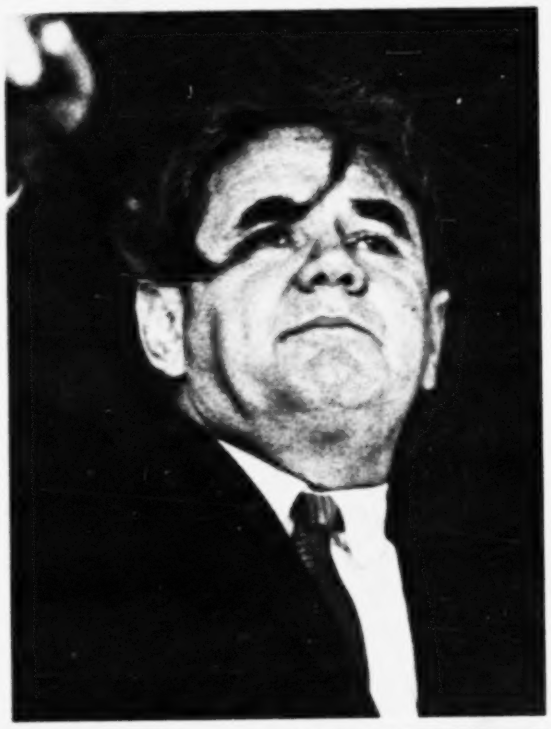

System Analysis in Planning

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As we discuss the application of certain system analysis techniques to educational planning, I am going to assume that at least some of you are relatively uninitiated with respect to the system approach, and may be musing over such questions as: "What connotations are associated with the term 'system' as it is used in talking about 'system analysis'?"; "What does 'system analysis' mean?"; "Why bring up the topic of system analysis in relation to educational planning?"; "If there is some possible use of system analysis in educational planning, how is system analysis accomplished?"

In trying to build my comments around these questions, I may at times unintentionally insult your intelligence by laboring the obvious, being redundant, and appearing pedantic. I will resort to a certain amount of defining and explaining in general or abstract terms. I hope you will forgive such professorial practices. I also will try to be more concrete and expect to introduce a number of education-based examples in an effort to illustrate the application of system analysis to education.

The System Approach

What is meant by the system approach? I beg your indulgence as I try to spell out what the so-called system approach means to me.

I would like to interject here a quotation from remarks recently made by Alexander Mood (1964), retiring president of the Operations Research Society of America, in addressing himself to "the system approach to instruction." Dr. Mood begins his comments by arbitrarily distinguishing between *systems approach* and *systems analysis*. "Systems analysis," Dr. Mood says, "is often used interchangeably with the term *operations analysis* and refers to the specific analytical technique which consists of constructing a mathematical model of a phenomenon and optimizing some function of the variables involved in the model. *Systems approach* refers to a much more general and hence less definitive idea. It is simply the idea of viewing a problem or situation in its entirety with all its ramifications, with all its interior interactions, with all its exterior connections and with full cognizance of its place in its context. Almost everyone is in favor of the systems approach in the same sense that almost everyone is in favor of God, country, and motherhood. The two ideas are related because a systems analysis tends to deal with a problem comprehensively; in setting up the mathematical model one uses the systems approach. However, one uses it primarily as a guide and as insurance against overlooking an important factor."

Dr. Mood, an eminent mathematical statistician, has taken a somewhat arbitrary position—as is certainly his privilege, in keeping with his involvement in operations research — in identifying system analysis with mathematical modeling. Operations research generally is thought of as the application of mathematical tools and techniques to the scientific study of organizations and operating systems, with the goal of providing those in control of the system under consideration with optimum solutions to problems relating to equipment, organization, procedures, etc.

If we accept the distinction Dr. Mood makes, the proper title of this discussion probably should be, "The Systems Approach in Educational Planning." However, all people who use the term system analysis do not insist, at least at the beginning, upon the development of a quantitative model. They may be content to confine themselves to the necessary first step of observation and the development of a logical description (and perhaps graphic record) of the operation of a system, or organization, which may suggest to them design changes or new designs that appear likely to improve system functioning. The system analyst, or system observer, if you prefer, in this case gathers information that relates to the system's objectives, requirements, functions, and environment, to conditions that influence the system, to significant relationships within the system, to the effect of the system's functioning on other systems, etc. True, the complete analysis will require logical and probably statistical treatment; it may require the conduct of experiments and the application of simulation techniques; it may require mathematical modeling. But my point is that system analysis usually has its foundation in observing and tracing the flow and transformation of information that take place in the operating system. Based on such analysis, various techniques may be applied and judgments may be made of the effectiveness of system functioning in light of agreed-upon criteria. From such judgments may follow suggestions for optimizing the functions of system variables and operation of the system as a whole.

I have taken the time to make the distinction noted by Dr. Mood in order to clarify what I expect to talk about today. I *will not* be getting into "operations research" and mathematical modeling; indeed, I am incapable of doing this. Instead, I will be talking chiefly about the importance of viewing education as a system, about a research approach to system study and design in the planning of higher education, and about some techniques that, as a first step in system study, may be employed to make system elements and their operation explicit and identifiable.

I would like to state four general observations that may set the stage for discussion of system study of education:

First, the numerous subsystems and their associated physical facilities and resources that perform specified functions aiding and abetting the attainment of education's objectives are *interdependent; interrelatedness* of components (persons, objects, activities, etc.) that make up operating units characterizes the organizations and functions that contribute to education;

Second, a necessary condition for the interaction of elements of any system, including the systems that contribute to the attainment of educational objectives, is the existence of a *common information network;* intercommunication is necessary to the functioning of a system as an organized entity and to the production of the intended output of the system, or the output of a meta-system of which the given system is a part;

Third, system functioning in education, as well as in any other context, is basically dependent upon control of the flow and transformation of information, both (a) among the subsystems or elements of a specified system, and (b) between a specified system that is expected to yield a particular product and external systems to which the specified system is intended to convey information (e.g., instructor to student, policy-making board to administrator, administrative officers to instructional divisions, etc.);

Fourth, *information processing* is inherent in the functioning of systems; by "information processing" we mean: the sensing, filtering, queueing, classifying, temporary storing, synthesizing, and transformation of available information; the making of decisions with respect to ways of transforming and conveying information so as to achieve the system's intended purpose; the programming and arranging of information content for forwarding; and the consequent forwarding of information. Whether information processing is carried out solely by human beings, or by human beings aided by machines, it is characteristic and necessary to system operations and therefore to the successful conduct of the educative process.

It is important to keep in mind that the purpose of approaching education from a system point of view is not merely to describe educational operations in a new set of terms, or even to make descriptions more complete and detailed than might be possible from usual casual observation. Such detailed description, particularly when it emphasizes interactions, is indeed useful; but an even more important contribution of a system approach is to make explicit the conditions of information exchange involved in educational activities and use of such data for suggesting how improved design of educational operations can be achieved and the goals of education more effectively and efficiently attained.

I hasten to note that there is nothing radically new about the system idea that organizing principles may exist (or *may be made to exist*), and that these principles permit seemingly independent parts to interact and thereby lead to conditions and products that would not have been possible in the absence of that interaction.

Interaction of physical objects has long been recognized, and descriptions of structural systems, both hypothetical and empirically derived, date to early philosophy and astronomy. Six centuries before the Christian era, observations in Egypt and Babylonia of the orbits of planets and their interrelationships permitted the development of an astronomy capable of predicting the relative positions of the sun and moon at specified times. Twenty-four hundred years ago, Empedocles was talking about four basic elements, and Anaxagoras a larger number, which were boldly conceived to exist in different spatial relations and configurations and in these varying arrangements to account for the natural objects encountered in daily life. Da Vinci, and later Copernicus, saw the organization of the universe in terms we might call systemic. And perhaps the system idea of organizing and controlling *human activities* reasonably could be traced to primitive man, when individual efforts were pooled and coordinated to accomplish some task.

Even the concept of information processing as representing the basis for operation of the system is not new—although the terminology may be recent. The human organism is itself a prototype of a system. The human individual is immersed in a world of data which, through the functioning of the unique nervous system man possesses, are sensed, assembled, coordinated, stored in memory, and compared with information previously stored. Man evaluates, makes decisions about, and transforms information/energy in order to meet specified needs—the culmination of these operations being some course of action the organism takes in adapting to and/or controlling its external world. Man's effectiveness in coping with his physical, social, and psychological environment depends upon the quality and quantity of information that he possesses about these worlds and the effectiveness with which his system can process that information and reach decisions leading to courses of action that will further his purposes.

Like many systems, the human organism is an "open system" (i.e., a system which enters into mutual exchange of information with other systems in its environment—a system that is affected, not only by the interaction of its component elements, but also by other systems external to it, and one whose functioning results in effects which may influence other systems in the given system's environment). The systems we will be thinking about in education are "open systems."

Theoretical considerations of the properties of open systems as they apply to living organisms, and to individual and social human behavior, appear to have been introduced relatively recently. Bertalanffy (1950) apparently was one of the first, if not the first, to stress the importance of "open systems" (and also the "generality" of the system approach to a wide range of disciplines). Bertalanffy described a number of properties that he believed characterized systems and, according to his own statement, explicitly called attention to the "open system" concept about 1932. Psychologists, educators, and other behavioral scientists were made acquainted with the possible generality of the application of system concepts during the early 1950's. Their expression of interest in system thinking dates approximately from the publication of James Miller's article in 1955. It may be noted that the basis of the thinking reported by Miller actually dated half a dozen years back to the deliberations of a group of University of Chicago scientists (a number of whom later moved to the University of Michigan) who began to consider whether a sufficient body of facts might exist to justify the development of an empirically testable general theory of behavior; from their exchange of ideas came a definitive statement of general systems theory as it might be applied to the behavioral sciences.

Some Properties and Characteristics of Systems

In order, later, to make a transition to educational systems, I would like to spend still a little more time dealing with abstract concepts and say something more about the properties and characteristics of systems in general.

Preliminary Definition of "System"

I will begin by defining the term *system*. Simply stated, a system is any identifiable assemblage of elements (objects, persons, activities, information records, etc.) which are interrelated by process or structure and which are presumed to function as an organizational entity in generating an observable (or, sometimes merely inferable) product.

System Components

Frequently, a constituent element (object, person, etc.) of a specified system exhibits in itself the characteristics ascribed to systems, and, as such, constitutes a subsystem of the system of which it is an element. In other words, any element may itself constitute a system. Thus, systems may be very large or they may be small. Smaller open systems combine to form, in a hierarchical fashion, larger systems. While both the aggregation of systems into suprasystems and the segregation of systems into subsystems is possible, the operating principles generally are the same regardless of the size or complexity of the system under consideration.

The variety of elements which may be components of systems is as exhaustive as the categories of objects and events which may be provided for by a logic of classes. Some of the kinds of elements likely to comprise the systems we will be most interested in are persons, identifiable physiological and psychological/behavioral processes characteristic of persons, physical objects including machines, combinations of persons and objects (such as those represented by a teacher and student), classrooms, instructional procedures, student-scheduling activities, or any other organizational or operational units, events, procedures, records of information, etc., associated with education practice.

Interrelationships Among System Components

The elements of a system are likely to be organized in a very complex way, and the interrelationships are often difficult to discern; indeed, sometimes little more can be directly observed than the conditions influencing the system (inputs) and the product of the system's functioning (output), in such cases we may choose to refer to the system by the slang term "black box." We can observe what "goes in" and what "comes out," but the elements and their functioning are obscured. Frequently, however, information about the system, its components, and their operations can be obtained, and salient features of the system can be identified; the interaction or exchange of information among the elements and significant characteristics of information flow and information transformation leading to the system output can be determined.

Ideally, the interaction of system elements is orderly, coordinated, and optimally organized to produce the intended system output efficiently and with fidelity. Few systems attain this ideal. In addition to the research goal of extending knowledge, therefore, the chief purpose in systems study is to discover ways of designing systems, or redesigning existing systems, to minimize the probability of inefficient operation leading to a product of low quality, and to develop an organization that will adequately provide for, or optimize, the control and flow of information necessary to produce the desired effect or product.

Information Exchange

The functioning of the interdependent elements of a system as an entity is made possible by the exchange of information among the components; the elements or subsystems of a system are united by a common information network. The term "information" is used at this point in an extremely broad sense. (I often use it in a more specific, though related, sense in discussing the information system aspects of instruction and learning.) Information, for the moment, (and as I have been using the term throughout the discussion) may be thought of as *any state or property that is capable of being communicated*. This definition is broad enough to be acceptable from either the syntactic, semantic, or pragmatic viewpoint. Information may be considered by the electronics engineer as synonymous with "energy." It may also be considered to signify a state or property that is potentially subject to common identification by the source and the destination of the information, i.e., that has "meaning"; in this semantic and pragmatic sense, information includes facts, concepts, rules, sets, and skills. Information, thus defined, possesses meaning for the receiver/destination in the sense that the communicated facts, rules, etc., (a) either provide a context, or fit into some existing context, and (b) provide associations and cues for their selection when there is need for retrieval and application to future behavior or courses of action.

Information exchange is the communication of some state or condition (either as it exists or in some transformed character) from some source element (subsystem), or elements, to some potential receiver element or set of elements. When a magnet attracts a particle of iron, information is exchanged—and it results in observable action. Information is exchanged among the mechanical parts of a spring-driven clock as distorting force on the spring is removed and energy is communicated from part to part of the clockwork system. A transducer communicates information in the form of electrical charges. Information in the form of spoken or printed words, movements, or any stimuli capable of being sensed and perceived via the human nervous system may be exchanged by person to person (or object—e.g., book—to person) communication.

When we think in terms of information systems and information exchange, we introduce many interesting problems concerned with "noise" (i.e., conditions which interfere with the communication of an intended item of information), optimal redundancy (i.e., the degree to which repetition of the item of information is useful), and the capacity and readiness of the receiver (i.e., overloading—providing too much information at a time, and underloading—providing too little information).

It should not be assumed that information exchange by systems is necessarily unidirectional; frequently, as already has been noted, it exists as *interaction;* i.e., the elements are interrelated by a set of conditions which is uniquely conducive to their mutual exchange of information or to feedback. This, of course, is true of most chemical reactions. It also is true of human information exchange in a system; the elements among which the information is exchanged when the system processes information must operate within a common context, and not only must information that is successfully conveyed be adapted to the state of readiness of the receiver-elements, but mutual exchange of information must occur if the system is to function successfully (e.g., questions must be answered, different components must contribute different kinds of information, information must be clarified and incorporated through expression of associated concepts, etc.).

Inputs and Outputs

Another characteristic or property of open systems is their capability of receiving inputs and producing outputs. I think I need not go into this further if you will simply recall that *inputs* (whether endogenous or exogenous) are the conditions which are sensed by a system and which the system analyzes, synthesizes, and transforms; and *outputs* are the responses of a system, or the phenomena representing the end-activity of the system (i.e., the conveyance of information across the system's boundary, making that information available for receipt by another system). Coded inputs are inputs which are so linked that a process of one system produces an output which, as an input to another system, conveys meaningful information. Uncoded inputs, or random energy, constitute "noise" in the communication system; noise interferes with conveyance of meaningful information. One particular type of input, feedback inputs, I shall mention as a separate topic in just a moment.

Information Processing

Another property of systems is their capability for processing information. Information processing was defined earlier as the system operation that mediates, or goes on between, the receipt of inputs and the production of the output of a system. We have suggested that information processing in the nervous system of an individual is a logical process which involves the filtering or selection of information inputs, their analysis and synthesis, their temporary storage, consideration of the objectives intended to be attained by the communication/output of the system in a particular situation, comparison and evaluation of alternative courses of action or behavior in the routing of information, decision-making relative to the content of information to be transmitted and the mode of its transmission, transformation of information as may be required to produce the intended output, and the arranging for (or programming of) the output behavior—all of these culminating in the forwarding or transfer of information to another system or individual.

Consistency of System Output

Still another characteristic of open systems, such as educational systems, is a capacity to maintain operation within predetermined limits—the property Bertalanffy and others have referred to as maintenance of a relatively *steady state*. It may seem somewhat difficult to reconcile the concept of a steady state (or equilibrated condition of the system within certain limits and with respect to limited fluctuations of its environment) with another property of many open systems, their characteristic incremental modifiability or continuous change in a given direction. On the other hand, any prediction of behavior requires an assumption that the individual (or group of individuals) possesses some consistency of behavior and that the system has means of providing for the maintenance of equilibrium of operation, at least within certain limits. The maintenance of room temperature through the functioning of a thermostat, or the maintenance of "normal" physiological functioning within the organism in accord with the principle that has been called homeostasis are examples of the maintenance of a steady state or equilibrium that an open system tends to attain. A school system, a class group, a teacher, or a pupil (as a system) are characterized by relatively steady states. The implied consistency of operation is a necessary condition if the system is to attain its objective.

Cumulative Change in Systems and In System Output

Capacity to maintain a steady state does not necessarily imply that the system may not be changed. This brings us to another characteristic or property of certain kinds of open systems, the capacity for cumulative modifiability. Adaptability and cumulative modifiability both imply flexibility, but they are not, of course, synonymous terms. Adaptability suggests leeway or flexibility in a system's functioning, which permits the system to respond to its environment by "keeping in tune" and maintaining a more or less balanced operating state. Cumulative modification takes the form of deviation amplification, in which the system proceeds further and further along a given direction of change, rather than fluctuating first in one direction and then in another to maintain equilibrium. With cumulative modification, subsequent states of a system and system operation show increasing change in a given direction and greater and greater divergence from the original state of the system. Examples of cumulative modifiability are the growth of an organism, the learning of an individual with respect to some skill, or the cumulative development of a school system with regard to some particular set of agreed-upon objectives.

Feedback

This seems to be an appropriate point to refer to the special class of inputs to systems, or influences on system operations, which are known as *feedback inputs*.

The maintenance of a relatively steady state of an open system is made possible to a large extent by its receptivity to *negative feedback*, the source of which is the output by a given state of the system, or the influence of the output of that system on the output of another system—such outputs, in turn, providing additional inputs for future functioning of the original system. The negative feedback principle may be illustrated by various examples such as the action of a thermostat in opening or closing valves of a heating or cooling system to maintain room temperature within selected limits, or the turning of the front wheel of a bicycle in the same direction in which the rider may begin to fall in order to maintain his balance. If negative feedback inputs resulting from the output of a system are not possible, the system cannot adapt to changes and contingent conditions of its environment and cannot maintain its stability of operation. The college or university administrator is well acquainted with feedback—feedback from faculty, alumni, students, community, accrediting associations, and numerous other sources.

Positive feedback inputs also often influence a system's functioning and its subsequent output. Thinking in terms of room temperature, if a thermostat provided positive feedback it might permit and regulate a steady increase in temperature. Change in the system would take place as a result of the feedback inputs, but the change would be in the same direction, rather than toward equilibrium as negative feedback. Maruyama (1963) (to whom I will refer again, and in more detail, in a few moments) recently referred to positive or divergence-producing feedback inputs as "deviation amplifying" inputs. Positive or deviation-amplifying feedback provides conditions leading to continued divergence along some direction, as illustrated in the processes of growth and learning.

The modifying of sensory-motor responses in throwing darts at a target in response to cues provided by visual perception of the results of previous throws, or the influencing of cognitive learning of the student in response to knowledge of examination questions that have been correctly or incorrectly answered may, at first glance, appear to be simply examples of negative feedback. Certainly they lead to "response correction." But they also involve positive and incremental feedback in that the "corrections" tend to be cumulative in their influence upon behavior and to lead to behavior which increasingly deviates from the original behavior.

Equifinality.

Still another property of open systems which is readily apparent in education systems is that Bertalanffy calls equifinality. By equifinality, as originally defined by Bertalanffy and as generally used in system terminology, we mean that different initial conditions and different means may result in a similar final state or "product" being reached by the system. Such a concept is of obvious application to instruction in the schools, and to administrative or other educational processes. In the area of instruction, for example, we might think of teacher-systems who start with different initial conditions and employ different approaches but convey to students (i.e., receiver/learners) information content or meaning which is identical regardless of the approach or procedure followed. A teacher, instructing a student in geometry, may take a deductive approach or may take an inductive approach; the same end-result, in terms of acquisition by the student of a concept (i.e., information) is being sought and attained. Similarly, teachers who differ widely in styles of behavior and capabilities may arrive at the same end-product insofar as the meaning of the information they transmit to students is similar and leads to similar student behavior.

Summary of the System Concept

To summarize, one way of defining an *open system* is to describe it simply as an assemblage of *interdependent* elements which function together as an entity (the intrasystem functioning being characterized by some form of interaction made possible by information exchange among the subsystems or elements of the system under consideration), an organized assembly of elements which is capable of receiving information (stimuli, inputs) from other systems in its environment, and which is expected to produce an output or product which conveys information to some external system—i.e., which influences some aspect or aspects of its (the given system's) environment.

Systems therefore involve elements that perform specific functions or operations which are governed by operating rules or "controls." The principles that comprise these "controls" set limits and restrictions and provide checks necessary to the system's functioning; they define the activities to be performed by particular elements, the information routing within the system, the classes of inputs that will be admitted to the system, the order in which inputs will be accepted, stored and acted upon, the transformations of information that will be made, and the character of the system output.

Some Aspects of Education Viewed in a System Framework

Perhaps I have dwelled too long on the abstract characteristics of abstract systems. I would like now to try to establish a rationale for viewing certain educational operations in a system framework.

The noun "education" often is used in a broad sense to refer to the social institution established to pass along knowledge, value systems, and culture in general. In a somewhat narrower sense, it is used to refer to the practice of instructing and the processes or operations involved when "sets," skills, facts, concepts, and rules for manipulating facts, concepts, etc. are made available to individuals who previously lacked such information with the intent that those individuals acquire and store the information. But whenever the term education is encountered there is the implication that personnel and resource materials are organized to perform designated functions which, directly or indirectly, are expected to contribute to the acquisition of potentially useable skills, attitudes, sets, knowledge and understanding on the part of learners or students.

The individuals, facilities, organizations, and activities involved in education may be thought of as comprising a very complex system—really an octopus-like metasystem made up of a number of identifiable subsystems, each of which possesses unique characteristics and each of which is complex in its own right. A single individual, such as an instructor (or a student, if you wish), may be conceptualized as a system made up of a number of subsystems; the classroom, consisting of instructor, students, learning media, and other facilities, certainly may be viewed as a system; an academic department is expected to operate as a system; a university as a whole represents a system.

Within an operating over-all structural organization, such as a college or university, we also may think of suborganizations involving systems or processes such as "instruction," "policy making," "fiscal administration," "student record keeping," counseling," "personnel administration," and the like, each capable of being broken down into smaller subsystems and each possessing the essential characteristics we have described as properties of all systems. The library and its operation provides an example, *par excellence,* of a system (containing component subsystems) which interacts with numerous other subsystems in the operation of an institution of higher education.

Considerations of human and machine information processing and information exchange between individuals and groups representing systems with varying functions within the education framework, are basic to the conduct of education. Yet for the most part, educators have given little heed to the systemic nature of educational activities and organizations or the applicability of system study to the evaluation and design of educational programs and services.

It is not difficult to assemble examples to support this premise and to illustrate how lack of attention to information processing and information control is a major source of educational problems.

In the area of student personnel we find one of the most obvious effects of less than optimal use of system study and design and attendant information processing. Information about students (e.g., previous records and reports, test scores, information about students' homes and economic conditions, etc.) is not readily available to teachers, counselors, and administrators due to inefficient information storage and processing. Similarly, the counseling function in schools and colleges, potentially important in guiding and advising students, often is inefficient due to poor availability of information to the counselor, inability of the counselor to transmit useful information to the student properly, and inadequate feedback of information about students to counselors, administrators, and teachers.

In the field of instruction, the transmission of information through teacher, textbook, demonstration, laboratory experiment, teaching machine, or programmed lesson, etc., is often hampered by inadequate establishment in the student of the background (i.e., state of readiness) necessary for receiving the information upon which the lesson is focused, by ineffective methods of presentation characterized by poor information filtering, channeling, and programming on the teacher's part; by excessive interference; and by little or no feedback of results to the student, teacher, curriculum planner, textbook writer, or others charged with arranging and presenting the content to be learned.

"Team teaching," which has been widely heralded (and which occasionally has been attempted at the college level), would seem to be basically dependent upon careful attention to system design and information management directed at optimal coordination of functions of the members of the teaching team; yet much of the planning and the practice in connection with this concept has been accomplished with little or no attention to information systems thinking and design.

These and other inadequacies in system design and information control contribute significantly to such recognized, and often highly publicized, problems of education as inadequate provision for individual student differences, neglect of remedial teaching/learning (in spite of the fact that one-third of our able students are under-achievers), and student failure and maladjustment.

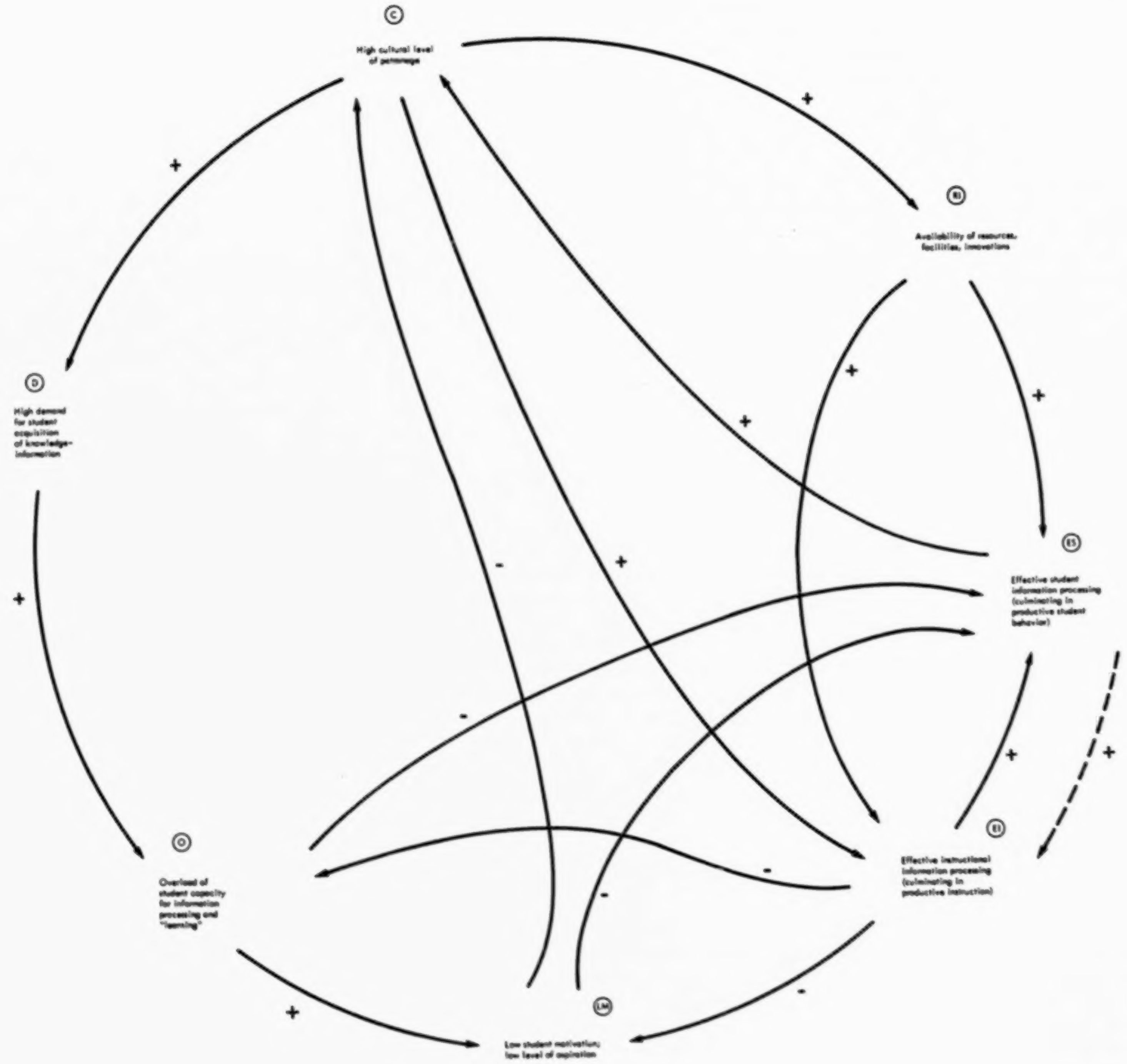
I might add that, although it provides no panacea for all problems of educational systems, the introduction in the system of an organizational unit which is concerned exclusively with "information processing" may be an effective way of alleviating some of the problems of information exchange and inefficient system operation. I refer to an organizational unit, which may be either manually operated or may be operated by persons aided by a computer, that provides an information storage, retrieval, transforming, and relaying station for the college. Such a unit would be equipped to handle student data, curriculum data, administrative data, faculty data, etc., of various kinds. It would receive information from a variety of sources, classify the information, store or file it, retrieve it on request, transform it in accord with the need of the requestor, and relay the information in an efficient manner. I will not dwell on this, but I suggest it may be an important consideration in educational system design for the future, particularly as the quantity and complexity of information involved in educational operations increases with the increased size and complexity of institutions.

Interaction of Systems in Education

In Figure 1, I have selected a few educational systems that operate in higher education and have gone through an exercise which is all too obvious in its implications. The chart I have prepared is one suggested by a similar diagram relating to a different area and published by Dr. M. Maruyama last year in *The American Scientist.* I might mention that Dr. Maruyama takes of the point of departure for his article from the fact that "cybernetics" has been thought of largely as a science of self-regulating and equilibrating systems, such self-regulation being made possible by negative feedback, or what, from the standpoint of system change, might be referred to as "deviation-counteracting" feedback networks. The "second cybernetics" to which Maruyama refers in the title of his article emphasizes "deviation-amplifying" feedback processes—processes of mutual causal relationships that amplify some "initial kick" in a direction and build up deviation and divergence from the initial condition, thus leading to change in the system. Maruyama cites various examples of this phenomenon such as "compound interest" in banking, the growth of large cities, the growth and development of living organisms, and others.

Certainly deviation-amplifying situations are familiar to those of us in education. What a student learns makes it possible to learn more in that area; and as he learns more he is both motivated and equipped with the necessary set or readiness to learn still more along that same direction. Also, as he applies what he has learned, additional information is cued or suggested which in turn makes a larger information store available for learning not only by himself but by others. I need not multiply examples.

Figure 1 reveals what I have assumed to be some positive and negative causal relationships between selected conditions or aspects operating in the educational system. (It obviously is very fragmentary and is used only for illustration.) It may be interesting to note that within the diagram both deviation-counteracting (represented by minus signs) and deviation-amplifying (represented by plus signs) loops are illustrated. It also may be of interest to note that if two negative relationships are involved in a particular loop, the negative influences may balance out. An example of a positive loop, of course, is C to RI to ES to C. An example of a negative loop is C to D to O to LM to C. I think you see the effects that are implied by noting the interactions of these conditions. You may wish to note that the loop EI to LM to C to EI involves two negative relationships; thus, effective instructor information processing, being negatively related to low student motivation, would imply that effective teaching would produce higher pupil motivation. Higher pupil


C
High cultural level of patronage
RI
Availability of resources, facilities, innovations
D
High demand for student acquisition of knowledge-information
ES
Effective student information processing (culminating in productive student behavior)
O
Overload of student capacity for information processing and "learning"
EI
Effective instructional information processing (culminating in productive instruction)
LM
Low student motivation; low level of aspiration

EXAMPLES OF MUTUAL CAUSAL SYSTEMS IN EDUCATION:

(1) Deviation-counteracting systems (negative feedback; equilibrium producing)

(2) Deviation-amplifying systems (positive feedback; divergence producing)

Suggested by: Maruyama, M. "The Second Cybernetics: Deviation - Amplifying Mutual Causal Processes." The American Scientist, 1963, 51, 164 - 179.

D. G. Ryans SDC '64

Figure 1

motivation, in turn, might be expected to raise the cultural level of the patrons of the institution (since high cultural level and low pupil motivation are negatively related and if student motivations were improved the cultural level might be expected to increase), and with increase in cultural level of the patrons one might expect more concern on the part of alumni and others, the availability of more money, and greater emphasis placed on more effective instruction. This, at least, provides an interesting system exercise.

Research Approach to System Study

Figure 2 is a chart I have used several times with slight variations. It is intended to summarize the procedure followed as one studies an educational system with a view either to designing a new system or redesigning an existing system.

I think it is unnecessary to point out that the same general procedure would apply whether we were trying to encompass in our study consideration of all of the vast number of systems and subsystems involved in carrying on a higher education enterprise, or if, on the other hand, we wished to focus our attention on some relatively smaller and less complex subsystem and its set of operations. For example, the system analysis might deal only with the physical plant, or the operation of the registrar's office or library—or, even more likely, on some subsystem within one of those systems.

The diagram is intended to be general and broad in application; but it does indicate some of the sorts of considerations that may be taken into account as system research is undertaken.

The Education System

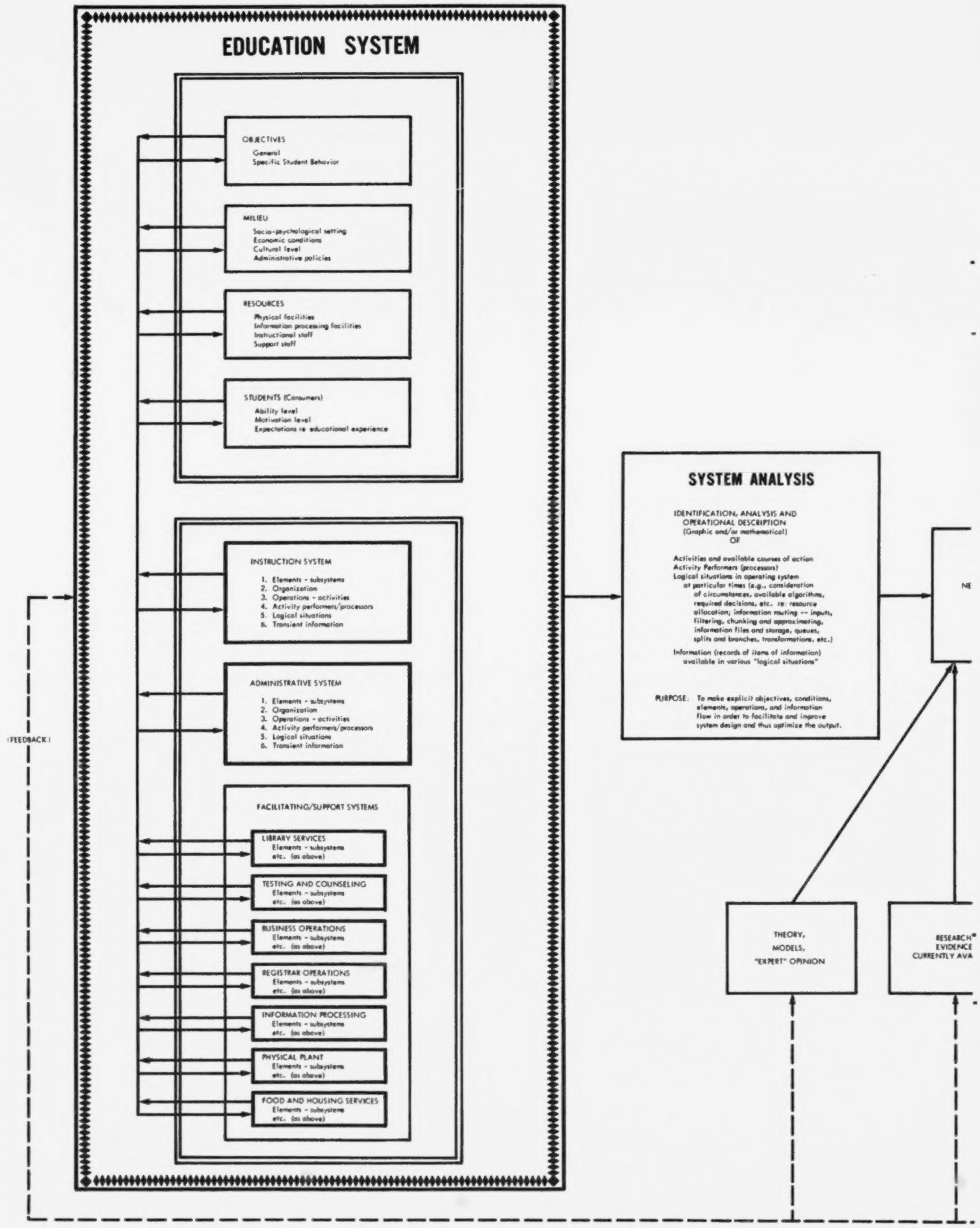
At the extreme left of the chart we begin with a block or box that is intended to represent the existing education system (or, perhaps, a system that actually does not currently exist, but which incorporates the ideas and values of a particular group of educational planners, together with the real-life context and constraints within which the system would need to operate—a new university, for example). It is important to note that this large box at the left of the chart includes a variety of conditions and operations. Some of these conditions, prior to system research, may never have been consciously recognized, even though they play important parts in the operation of the educational program. Others may have been given lip service, but little attention actually paid them in educational planning or practice. Institutional "objectives" may be a good example of something we talk about, state vaguely in catalogues and in public relations materials, sometimes establish committees to study, but almost never spell out with sufficient specificity to be of any possible value in the conduct of the educational endeavor we are undertaking. There may be little point in repeating again what has been said so many times during the last few years; nevertheless, the fact remains that few planners of courses of instruction have completed the arduous task of describing the intended outcomes of instruction in terms of specific student behaviors expected. I will not labor this point further, but I do want to comment that all system study is conducted in light of the objectives and purposes the system is intended to achieve; system study cannot be accomplished without an explicit statement of objectives. If uncertainty exists with respect to the objectives of a system, it is difficult to see how the system's functioning could be evaluated, or, indeed, how the system could continue to operate.

System Analysis

Starting with an existing or a theoretical education system, the first effort of the system researcher normally would be to attempt to identify relevant information about the system's objectives, inputs to the system that influenced its operation, basic elements or components of the system, the modes of operation-interaction of the system elements, the ways in which information was transformed by system operation, decision points in the flow of information through the system, controls that were exercised upon the system operation, the end-products of system functioning and their relation to the system objectives, etc. On the chart I have labeled this block "System Analysis." We might call this *qualitative system analysis*, or if we wish to be more modest we might simply refer to it as an operational description of the system. It would involve noting the objectives, the activities performed, the performers of those activities, the logical situations involved as the activities were performed, and the records of information that were available at different points and phases of the system's operation. Thus, the first effort of the system researcher would be to try to make explicit, in as much detail as would seem to be required, the salient conditions influencing operation of the system and its output. One result of this phase of system research would be likely to be detailed "flow diagrams" showing the operations involved and the status of information at various points as it was processed through the system; quantification and the making of probability estimates regarding the functions of variables also might be possible. I will have something more to say of the procedures involved in the analysis, identification, and operational description of the system later in my presentation today.

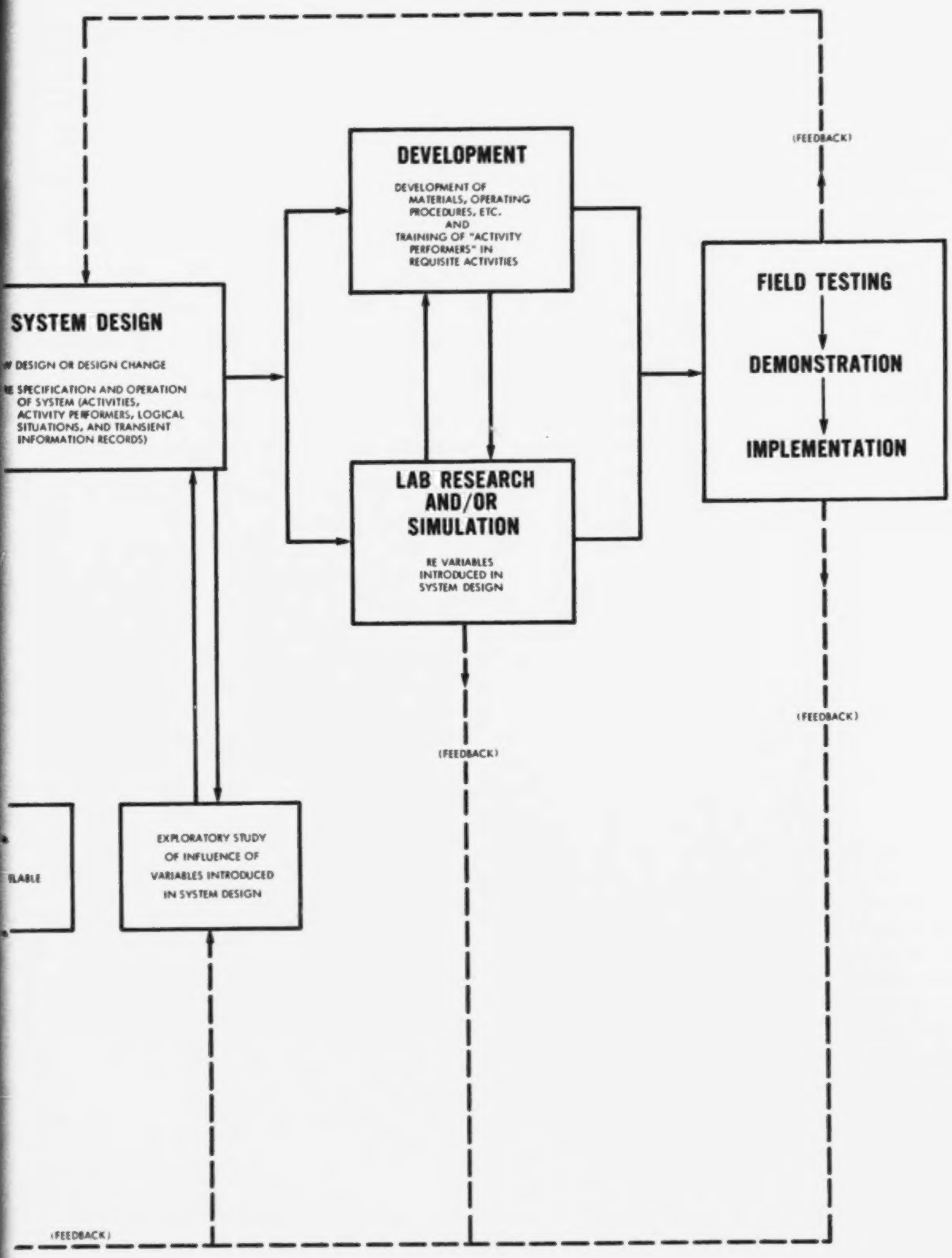
System Design

Continuing with our attention to Figure 2, we move to the block designated "System Design." Presumably system analysis would have been undertaken with the intention that new designs or modifications of existing patterns of operation might be suggested which would enhance system operation. Please note that in the ideal application of these procedures it would not be expected that analysis of the system *alone* would automatically suggest improved design. Certainly any thoroughgoing system designing of this sort would take into account currently available research evidence that might have bearing upon problems related to the system under consideration,


EDUCATION SYSTEM
OBJECTIVES
General
Specific Student Behavior
MILIEU
Socio-psychological setting
Economic conditions
Cultural level
Administrative policies
RESOURCES
Physical facilities
Information processing facilities
Instructional staff
Support staff
STUDENTS (Consumers)
Ability level
Motivation level
Expectations re educational experience
INSTRUCTION SYSTEM
1. Elements - subsystems
2. Organization
3. Operations - activities
4. Activity performers/processors
5. Logical situations
6. Transient information
ADMINISTRATIVE SYSTEM
1. Elements - subsystems
2. Organization
3. Operations - activities
4. Activity performers/processors
5. Logical situations
6. Transient information
FACILITATING/SUPPORT SYSTEMS
LIBRARY SERVICES
Elements - subsystems
etc. (as above)
TESTING AND COUNSELING
Elements - subsystems
etc. (as above)
BUSINESS OPERATIONS
Elements - subsystems
etc. (as above)
REGISTRAR OPERATIONS
Elements - subsystems
etc. (as above)
INFORMATION PROCESSING
Elements - subsystems
etc. (as above)
PHYSICAL PLANT
Elements - subsystems
etc. (as above)
FOOD AND HOUSING SERVICES
Elements - subsystems
etc. (as above)
(FEEDBACK)
SYSTEM ANALYSIS
IDENTIFICATION, ANALYSIS AND OPERATIONAL DESCRIPTION
(Graphic and/or mathematical)
OF
Activities and available courses of action
Activity Performers (processors)
Logical situations in operating system at particular times (e.g., consideration of circumstances, available algorithms, required decisions, etc. re: resource allocation; information routing -- inputs, filtering, chunking and approximating, information files and storage, queues, splits and branches, transformations, etc.)
Information (records of items of information) available in various "logical situations"
PURPOSE: To make explicit objectives, conditions, elements, operations, and information flow in order to facilitate and improve system design and thus optimize the output.
NE
THEORY, MODELS, "EXPERT" OPINION
RESEARCH* EVIDENCE CURRENTLY AVA

SYSTEM APPROACH TO EDUCAT

Figure 2


(FEEDBACK)
DEVELOPMENT
DEVELOPMENT OF MATERIALS, OPERATING PROCEDURES, ETC. AND TRAINING OF "ACTIVITY PERFORMERS" IN REQUISITE ACTIVITIES
SYSTEM DESIGN
W DESIGN OR DESIGN CHANGE
RE SPECIFICATION AND OPERATION OF SYSTEM (ACTIVITIES, ACTIVITY PERFORMERS, LOGICAL SITUATIONS, AND TRANSIENT INFORMATION RECORDS)
FIELD TESTING
DEMONSTRATION
IMPLEMENTATION
LAB RESEARCH AND/OR SIMULATION
RE VARIABLES INTRODUCED IN SYSTEM DESIGN
(FEEDBACK)
(FEEDBACK)
LABLE
EXPLORATORY STUDY OF INFLUENCE OF VARIABLES INTRODUCED IN SYSTEM DESIGN
(FEEDBACK)

ION PLANNING

"theories" about the system and its operation if such existed, possible models and analogies that might aid in design of the system, opinions and ideas suggested by recognized and experienced "experts" in the field—all of these in addition to the evidence yielded by the system analysis. It also would hardly be expected that a system design would emerge "full-blown" and capable of doing all that might have been expected of it. More likely than not, systematic exploratory research would be engaged in to determine whether the effects of variables involved in the system's operation did indeed have the expected effects. Following a series of trial-and-error exploratory studies confirming some of the suggested design features and rejecting others, it normally would be expected that necessary materials and procedures would be developed (including the training of performers of the required activities) and that full-scale tryouts might be conducted under laboratory conditions, or the system might be simulated, either manually or on a computer. (If it were not too complex, the simulation might, as Mood suggested in an earlier quotation, be symbolic and mathematical in nature.)

In any event, the ultimate test of the system would be in the field and under real-time, real-life operating conditions. If the system appeared to work in the realistic setting, it would be expected to be made available for demonstration and implementation. Assuming it did not conflict with the habit systems of the users, the new design that had begun with the analysis of the existing system would be "fed back" to the operating system and the new design incorporated.

It is important to note that the feedback loops lead not only from the final field testing and demonstration, but from various phases of systems research which may affect further modification of system design (and also modification of currently available research evidence and existing theory in the area). The result of the process as a whole may have far-reaching effects upon objectives, conditions, and system operation.

The General Nature of System Study

Throughout the remainder of the discussion I am going to use the terms system analysis and system study more or less interchangeably. Either term may include quantification and symbolic modeling. For the most part, however, I will be considering only the more general qualitative problems of systems study.

By system study or system analysis will be meant observation directed at the determination of the relevant elements of a system and their operations and interactions as they contribute to the system's functioning, with particular attention to the relative efficiency or inefficiency with which the system outcome is produced. It will be necessary to identify and analyze the properties of elements and subsystems in order to determine chains of influence which contribute to activities and events, and it will be necessary to put these pieces together and to synthesize the information to describe the larger systems on which our interests may be focused.

As noted by Peach (1960) and others, the objective of system study is to identify the properties of a system and from this information to predict the properties involved in future operations of the system. Since changes in conditions change system operations, one can never know completely how a system may operate in the future. To be as certain as possible, however, one seeks first to identify the properties that are likely to remain more or less stable in spite of considerable changes in the environment. (Often such properties, in addition to qualitative description, can be quantified and defined by objective measurements—e.g., the number of channels in a communication system, the time required for information to be retrieved from memory or storage, capacities of the information processors, etc. Among the significant items of information sought by the systems analyst are dependency relationships between the system and *foreseeable* changes in the environment. When data have been quantified, the data may be treated to yield a statistical estimate of prediction—e.g., an indication of the probability of overload leading to failure of the system, the average time an item of information or a performer of an activity may be detained in a queue, or possibly the loss of information under noise conditions. It may be of interest to note that in system analysis one tries to visualize the performance of a system not only as it may be expected to operate under ideal conditions when all is running smoothly, but also how it may be predicted to operate when subjected to conditions which may interfere with or destroy the normal functioning of the system. (Approaches frequently employed in attempting such estimates, particularly when the expense and/or danger is important, involve gaming and simulation.)

System analysis in education is concerned primarily, then, with how data or information of various kinds enter the system under consideration, how information is handled or processed by the system, and how it is directed out of the system. It is concerned with the channels of communication within the system and also with the channels of communication between the specified system and other systems external to it. It is concerned with how the system elements or subsystems perform and how they interact.

And, as we just noted above, it frequently is concerned with conditions that lead systems to perform less effectively than their indicated potential. The human operator in an educational system may fail to accomplish an intended outcome because he is insufficiently trained, because of frequent absence from his post, because the information he receives is ambiguous or not clearly understood, or because receipt of information and subsequent response is inhibited by his own lack of readiness to receive the information. He also may fail because the directions and algorithms having to do with his performance in the situation are not clear. In decision-making situations which characterize information processing, he may be incapable of selecting appropriate courses of action with an expected degree of success. It is from knowledge of possible failures of this kind that the system analyst should be able to profit in carrying out a program of observation that will reveal the weaknesses of the system elements under study and estimate the average expected performance of elements and of the system as a whole under varying conditions.

Importance of Identifying Decision Points in System Operations

Particularly important in system analysis is the determination of (a) decision points where choice among alternative courses of action is required and (b) the decision-making processes and procedures that may be followed in the system in making choices. The determination of decision points is generally a function of the accuracy and thoroughness of the observation of the system analyst. The understanding of how human decisions are reached is far more difficult and complex and has reached only a relatively primitive level, whether considered descriptively or normatively.

Perhaps there are other points in this series of discussions at which consideration of the problem of decision-making in planning for higher education would be more appropriate. Nevertheless, the determination of decision points is an important function of the system analyst and should be at least noted here. Decision-making lies at the heart of human information processing and therefore at the heart of system analysis and design.

By human decision-making behavior, we mean the reaching of a state of organization of relevant information which predisposes (i.e., provides a set for) or determines, at some probability level, a course of action that will be selected from alternative courses of action for attaining some outcome or objective.

Typically, the conditions required in human decision-making include: (a) the identification and specification of objectives or intended outcomes; (b) the availability of alternative, but unequally efficient, courses of action for attaining the objective, one of which is assumed to represent the best or most efficient course of action; (c) a decision-maker, who must make the choice of a course of action from several alternatives (the decision-maker sometimes being the potential performer of the activity decided-upon, and sometimes only the director of some other performer); (d) information (either known or inferred) about methods for attaining the objective and, information about the probable consequences and concomitants of different courses of action; (e) a set of uncontrolled or unknown conditions affecting courses of action and influencing their efficiency in attaining an objective; (f) a state of indecision on the part of the decision-maker as to which course of action to choose; (g) available strategies, or sometimes sets of rules (with which the decision-maker may or may not be provided beforehand, and which, when the decision-making is left to the decision-maker's judgment, he may or may not be able to correctly apply) that may be followed in reaching a decision about a course of action to be followed; (h) a criterion, or value context, which reflects the objective to be attained and against which the consequences of a decision to follow a course of action may be evaluated; and (i) selection by a decision-maker of some activity or course of action for attaining the objective.

As defined, decision-making with respect to the choice of a particular course of action is distinguished from (a) the planning of behavior and transforming of information to permit following the selected course of action and (b) the actual activity involved in following a course of action that has been decided upon and planned. Reaching a decision is one process; planning the operation or behavior to be executed in following a decision and executing the course of action prescribed by the decision are others.

Decisions are called for at innumerable points in system operation. In a typical flow diagram, such as some of those that will follow, decision points are represented by diamond-shaped figures and outleading lines indicate different possible splits and branches (i.e., courses of action) that appear to be reasonable and appropriate depending upon different conditions noted. From the system designer's standpoint it would be ideal if the outcomes of all possible courses of action were known and an algorithm could be provided so that a set of directions could be followed approximately automatically. But decisions may be made with certainty only if the invariable consequences of all alternative courses of action, evaluated in light of the intended outcome or value, are known—and only if a decision-maker is completely rational. These conditions are seldom met. The consequences of alternative courses of action are usually known, or are assumed to be known, in terms of probabilities based on inferences from past observations. In such cases decisions must be made under conditions of risk; but when the relative risk can be inferred, approximations can be made of the effects of different courses of action on the system and its functioning. (Often the probabilities about consequences of alternative courses of action are completely unknown and then desisions must be made under conditions of uncertainty, i.e., by random methods.) Many educational decisions are of the second type, i.e., ones made under conditions of risk. Regardless of the degree of certainty associated with a decision (i.e., knowledge of the probability that choice of a particular course of action will lead to a desired outcome), decisions are constantly called for in the operation of educational systems; they therefore become one of the most significant classes of system data for the observer and analyst.

Since much planning and designing of systems is judgmental in nature and requires innumerable decisions, perhaps this discussion could have been devoted entirely to decision-making *per se,* rather than to an attempt to cover the general area of systems analysis. But with the broader topic of system study as our focus we will proceed to other considerations.

Some Considerations in Undertaking System Study

The following comments are by no means intended to serve as a complete guide to systems analysis. Rather, I would like simply to suggest a few of the problems that face the person who undertakes system study and system design.

First, I would like to run very quickly through some of the kinds of judgments that will be required prior to and during a system study. I will not dwell upon these at length.

Purpose of the Analysis

One problem that is faced at the outset of the system analysis is: "What is the objective?" Here I refer to the objective of the system analysis (rather than the important phase of system analysis that deals with the noting of the objectives of the system). Sometimes the objective of system study is to collect information in order to design a new system which, based upon experience with existing systems, may be expected to perform the intended function of the system more effectively (e.g., the establishment of a new college or university). Sometimes the objective is understanding of the system's current operation in order to revise or modify the operations to take care of increased load, e.g., increased flow of students. (The practice often has been to take care of such matters simply by establishing new colleges or increasing the staff, equipment or number of buildings of an existing institution. A careful system study may suggest other solutions and ways of handling the increased information processing that is required by the introduction of automated procedures or changes in organization and scheduling.) Sometimes the objective is troubleshooting—the identification of some condition or conditions leading to system failure or inefficiency, and to the elimination or rectification of such conditions. Sometimes a system analysis may be undertaken with the objective merely of making judgments about the feasibility of, and the problems and difficulties that may be encountered in, the establishment of an organizational unit, a program, or a procedure.

Scope of the Study

Another question that must be answered at the beginning of a system study has to do with the scope of the particular investigation. Suppose the objectives of the study are related to the physical plant. Is the study to involve the configuration of buildings on a campus so that the arrangement will be optimally functional in providing student access to necessary facilities? Or is the scope limited to the design of a particular building of a single classroom—one perhaps that might have movable walls and other accommodations to provide flexibility and ready modification? Does the system study have as its objective the improvement of instruction? Here the scope of the analysis could be very broad, or it could be restricted to some instructional subsystem or sub-subsystem and set of operations related to a particular subject matter or unit of instruction or instructional procedure. Referral to Figure 2 will suggest the many directions in which a system analysis might turn, keeping in mind that systems may be very large and all-encompassing or they may be relatively small. A system analysis conceivably might be undertaken with respect to *all* of the interacting sub-organizations within a college or a university, or only some relatively small set of operations. In any event, this is a judgment that must be made at the beginning of a system analysis.

Selection of Variables

Once the purpose and the scope of the system study have been decided upon, another problem that plays an important part in the conduct of experiments faces the system analyst. I refer to the problem of selecting relevant variables to be included in the study (and, obviously, determining other factors that are considered to be of less significance and are therefore to be excluded.) Continuing in this same vein is the problem of the aggregation of variables. For certain purposes it is conceivable that operations should be very thinly sliced and looked at in great detail; in other instances, reasonableness would dictate a number of detailed operations being included in single larger patterns for study. Similarly there is the judgment to be made regarding the restrictions that will be placed upon the range of the variables that are selected for consideration.

Designation of Criteria

The selection of a criterion, or set of criteria, against which to judge the system's effectiveness is another decision that must be reached by the system analyst. This is a problem that I have stressed over and over again in courses in the experimental design of educational studies. In the case of system research, the criterion usually is what the analyst is trying to suggest ways of optimizing. Mood comments on the criterion problem and its difficulty, using for illustration system analysis of instruction in a biology course and the relative amount of time that should be devoted to the use of films. He says:

> We may suggest with respect to biology films that the goal is to optimize the proportion of classroom time to be devoted to films. Why? Well, we want to maximize the amount of biology the students learn. Oh! So the real goal is to maximize the amount of biology learned. Yes, that is it. One thing you might do is drop history and mathematics so that three hours per day can be devoted to biology. No, no, no; the real goal is to maximize the amount of biology that can be taught in one hour per day. Oh! Even to the point of draining resources from the coaching of cheerleaders? God forbid! No! The real goal is to teach an amount of biology appropriate to a balanced education. What is a balanced education?

> And so, on and on, the issue can be pushed until one is debating the fundamental aims of education. Is it to impart knowledge and information? Or, is it to generate understanding? Develop analytical skills? Develop capacities for imaginative creativity and ingenuity? Develop the capability of making sound judgments and decisions? Or is it all of these. If so, in what proportions or in what priorities? (1964)

Having gotten us pretty deep in the thicket of educational philosophy and values, Mood ends his illustration at this point. What he has accomplished is to emphasize the need for a clear statement of the criterion or goal of any analysis undertaken—a statement that reflects as accurately and as consistently as possible the best judgments currently available with respect to the matter under consideration.

Obviously I have mentioned only a few of the decisions that must be made with respect to a systems analysis before it is undertaken. But we must move along.

Types of System Components the System Analyst Must Take Into Account

Next, I would like to talk a little about examples of the kinds of systems components that are likely to be considered in system analysis for educational planning.

I will suggest that four major categories of system components we might want to consider are: (1) activities; (2) the performers of activities, or "operational resources"; (3) information records with respect to activities and activity performers at particular times: and (4) logical situations in information flow through the system where "controls" may be exerted on activities, activity performers, and transient information records. I have listed some possible examples below:

Examples of System Components Likely to Be Considered in Systems Analysis for Educational Planning

Category	Examples
I. Activities—operations performed in information processing or information exchange	instruction, learning, counseling, records maintaining, facilities providing and maintaining policy making, personnel administration and providing of personnel services, finance administering, coordinating, managing, etc.
II. Performers of Activities or Operational Resources—processors, agents	students, instructors, books, journals, TV, films, instructional programs, computers and machines, counselors, clerks, architects, builders, custodians, chief administrators, deans, department heads, accountants, patrons, sources of support, etc.
III. Information Records—activities and activity performers in particular logical situations	status of an activity or activity performer, state of knowledge of progress through course or curriculum, number and allocation of students, staff, facilities, etc. physical resources, personnel resources, space requirements and resources, financial resources, instructional content (skills, facts, concepts, rules), etc.
IV. Logical Situations—in information flow where "controls" may be exerted on activities, activity performers, and transient information records	sensing (input) situations, filtering situations, logical stages and sequences in operations, buffer situations, queueing situations, aggregating situations, storage situations, retrieval situations, splitting and branching situations, "merging" situations, display (output) situations, etc.

I should point out that in suggesting these major categories of interest to the system analyzer I am borrowing and paraphrasing materials and ideas that were developed by a "Management Control Systems" project at System Development Corporation. As a part of that project a simulation model (a model adapted to computer simulation) of a hypothetical but representative business system was developed. The model served to clarify management problems and the nature of management control mechanisms, and in particular to focus attention on the function of such mechanisms in a total system context. It also served as a laboratory device for testing interpretations of existing hypothesized management controls. The system simulated was a manufacturing concern known as Mark I Business System, an organization composed of sales, engineering, order processing, accounting, purchasing, warehouse, personnel, production control, and manufacturing departments. Each department housed many activities which often interacted in complex ways with activities of other departments. The activities and information flow among them was represented in great detail and involved a total of some 4000 variables. The simulation model employed was known as SIMPAC; a general description of SIMPAC may be found in Lackner's report, "Toward a General Simulation Capability."(1962).

Currently in our Education and Training project at SDC we are undertaking to analyze and develop a model for simulating on the computer certain aspects of the operation of a secondary school. I will refer to some flow diagrams developed in that study, later in this discussion.

But now let me try to describe briefly the general nature of the categories of system components (activities, activity performers, information records, and logical situations) that concern us in system analysis.

Activities.

Activities are operations which take place, and which interact, when there is exchange of information. Activities of a system often recur. In the operation of a system, different activities are performed at different times and usually at different rates. (In order to handle such problems, we look to the "logical situations" and "controls" introduced in the system; the system usually will contain buffers or queues which are capable of storing information and keeping items in a "waiting line" between activities.) Activities in a system may exert direct or indirect control over other activities, or they may merely exchange information with them. Activities also may assign activity performers to and from other activities; they may modify the queue disciplines used by other activities when accepting or storing transient information; they may direct the flow of information by specifying input and output buffers for other activities. In the information processing context, these activities may be defined as a series of algorithms, or arithmetic-logical step-by-step operations.

Activity Performers.

Activity performers, or operations resources in a system, are people and/or pieces of equipment. An activity is performed if operational resources or activity performers are assigned to it and if the transient information records required for its performance are in its input buffers. The duration of a discrete performance of an activity is a function of the quality and quantity of the people and/or machines performing it.

Discrete performances of an activity may be identified by (a) the assignment to that activity of people and/or machines capable of performing the activity, and (b) the accessibility of information required for performance of the activity.

Information Records.

Records of transient information are generated by the discrete performances of activities on the part of activity performers or processors. More activities are performed than there are people or machines to perform them, and records of transient information tend to form queues between activities performed at different times or at different rates.

Controls.

Various logical situations can be identified which serve as controls under which the system is sensitive. For example, these include queue discipline—i.e., dictation of the waiting order of transient information in queues or waiting lines and of means of selecting records from the queues; resource allocation—i.e., assignment of operating resources or activity performers to various activities they are capable of performing; and information routing—i.e., designation of the source of information inputs to an activity and the destination of output information.

In preparing a graphic record of system operations, control blocks (representing logical situations) are set up for each component of the model—i.e., for activities, for activity performers, and for transient information records.

An activity control block, for example, may contain: an indication of the different phases of the algorithm expressing the activity; indicators of the performer time necessary for the current performance and the performer time already spent on performance; an indication of the possible minimum and maximum resources and current allocation of resources; counts of the number of times the activity has been performed, of the amount of performer time spent in performance, and of the amount of idle performer time; etc.

An activity performer block may contain: an indication of currently available performers or resources; an indication of the number of activities to which these performers are assignable; a list of assignable activities; an indication of the current allocation of resources or performers; a count of performers assigned to other activities than those in the list; etc.

A transient information control block indicates the nature or format of the relevant record and may contain: a count of currently waiting records; a list of such records; an indication of the order in which the records are held; etc.

To summarize, in conducting this kind of analysis, activities are separated from the resources (i.e., people or machines) that perform those activities, people and machines are considered in terms of their ability to perform activities, transient information in the system is identified, and control activities are indicated.

In providing a simple example of SIMPAC modeling (which will also serve to illustrate the categories of information a system analyst will be interested in identifying), Lackner (1962) describes the hypothetical identification of certain aspects of the operation of a small library. He describes the operating relationships of certain routines involving identifiable *activities* (indicated by straight underlining), operations resources or activity performers (indicated by a series of dots under the resource or performer), transient information (noted by a series of dashes under the transient information), and buffers where queues may form (noted by alternate dashes and dots beneath the buffers or queues). The system analysis may begin with a catalogue of observations such as the following:

> Visitors generate requests for books and place them in the request bin.
>
> Librarians examine requests for books from the request bin and place them in the find bin.
>
> Clerks match requests against books in stacks and either put books in ready bin or put requests in out bin.
>
> Books from the ready bin are read by visitors and placed in the return bin.
>
> Books in the return bin are stored by clerks in the stacks.

An information flow chart could be constructed which would indicate the relationships of the components identified in the above example. Such a chart, based only on the information given in the example would, however, show no control activities such as those directing the routing of information, modifying queue disciplines, or allocating resources among activities. So Lackner suggests the following illustration of a control activity as one that might be added to the library model:

> Librarian assigns clerks to storing books if queue in return bin is longer than queue in the find bin, or to matching requests if queue in find bin is longer than queue in return bin.

Note that in this "control" example both activities and activity performers, as well as queue data, are treated as transient information.

A number of additional control activities would be required, of course, to move the librarian from activity to activity, to represent the beginning of their tasks by the librarian and the clerks, etc. Each of the activities must be described by an algorithm, the composition of which must be contained in the transient records. Information used in control activities may be obtained from control blocks associated with the various activities, activity performers, and buffers or queues.

Flow Diagramming in Systems Study

To this point, I have mentioned some of the kinds of decisions that must be made in undertaking a system study and have referred to some of the kinds of categories to which the system analyst may give attention in making observations of the system. The next question is, "What does the analyzer do with the observation data he has gathered about the system?"

One thing he may be likely to do after the relevant data on the system operations have been assembled is to attempt to represent those operations in some readily perceived and non-ambiguous form, such as a logical flow diagram or flow chart. Later he makes statistical analyses of quantified data that are available; or he may seek to simulate the operation of the system on a computer and cycle it through time; or he may attempt symbolic or mathematical modeling of the system. But usually a first step will be to try to represent the system in terms of a flow chart.

An information flow diagram is simply a device for showing graphically the relevant functional relationships involved in system operation as information is exchanged. The term "information flow" is commonly used to describe what takes place when the action, and subsequent output, of one system performs a *selective operation* on another system, or when one element or subsystem of a system performs a selective operation on another element or subsystem. This assumes, of course, that the second system is adapted, or ready, to receive the output of the first system as a relevant or meaningful input, the output of the first system thus influencing the selection of action (i.e., decision-making relative to alternative courses of action) and subsequent output of the second system, or subsystem. Information flow occurs when an output of a "teacher information processing system" performs a selective function on the state of organization or orientation of a student, thus influencing the "student information processing system's" output. It is this information exchange or flow that so-called flow charts attempt to show. Just as an organization chart of an educational system or an industry shows structural relationships, a flow chart is intended to show functional relationships, i.e., to indicate the direction of information flow or influence between subsystems, or elements of the system.

Information flow charting is important in trying to discover how systems actually operate. The process uncovers and makes explicit relationships and lines of communication we frequently overlook; it also frequently shows lack of communication where we believed appropriate communication channels already existed. Information flow charting selects a

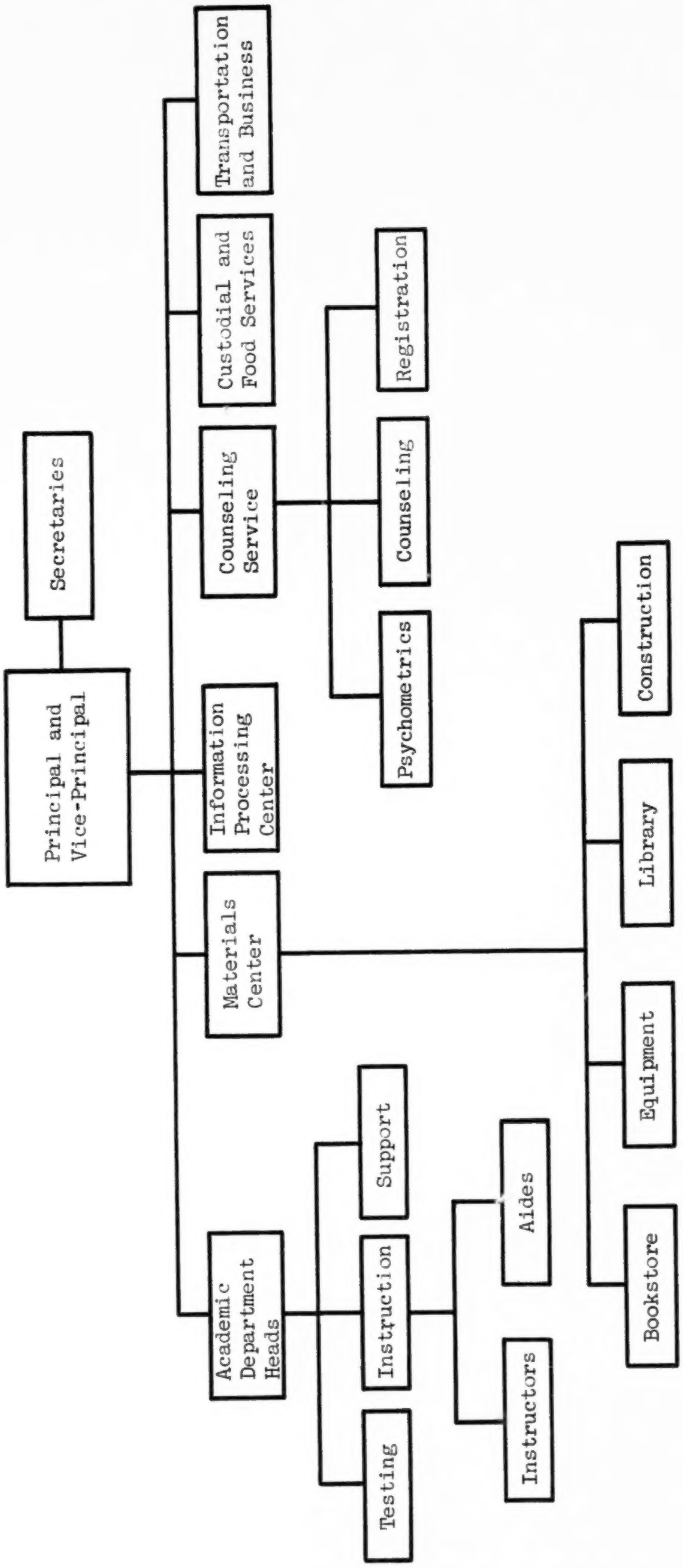

Principal and Vice-Principal
Secretaries
Academic Department Heads
Materials Center
Information Processing Center
Counseling Service
Custodial and Food Services
Transportation and Business
Testing
Instruction
Support
Instructors
Aides
Bookstore
Equipment
Library
Construction
Psychometrics
Counseling
Registration

Figure 3. Organization Chart for Continuous Progress School

Figure 3

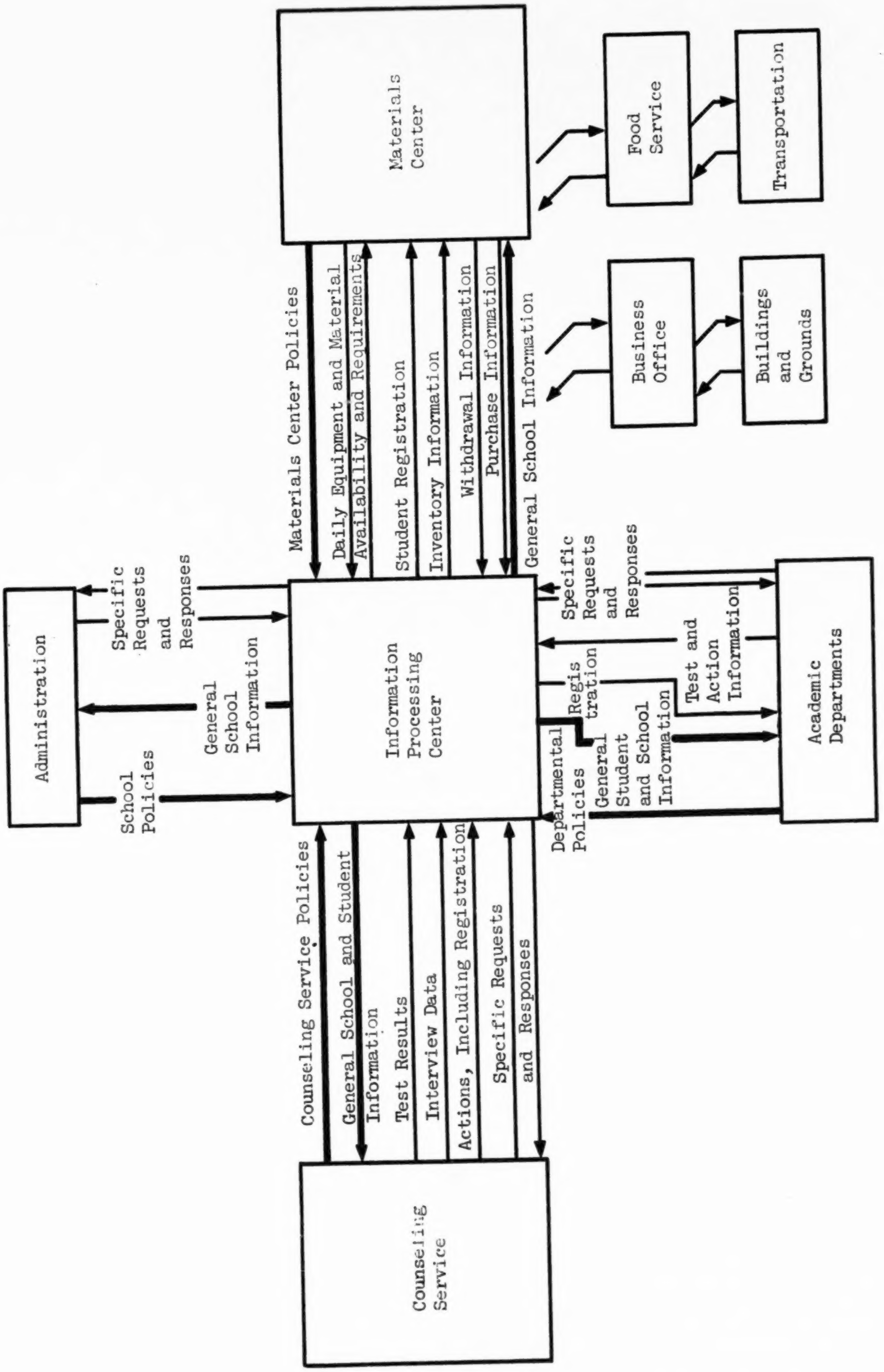

Materials Center
Food Service
Transportation
Business Office
Buildings and Grounds
Materials Center Policies
Daily Equipment and Material Availability and Requirements
Student Registration
Inventory Information
Withdrawal Information
Purchase Information
General School Information
Administration
Specific Requests and Responses
General School Information
School Policies
Information Processing Center
Specific Requests and Responses
Test and Action Information
Regis tration
General Student and School Information
Departmental Policies
Academic Departments
Counseling Service Policies
General School and Student Information
Test Results
Interview Data
Actions, Including Registration
Specific Requests and Responses
Counseling Service

Figure 4. Information Flow in a Continuous Progress School

Figure 4

particular aspect or subsystem of a system, or perhaps the over-all system as it operates in a particular environmental setting, for the focus of attention and concentrates on details of *specifics* (either observable, or inferred from observable data) of the operation of the subsystem or total system, noting input conditions, activities, resources, the status of information at various points in the information flow, decision points, output conditions and the effects of output, etc.

As we noted earlier in considering judgments required of the system analyst, selectivity must be exercised in deciding which system operations are to be presented and what are not to be included in a flow chart.

It is neither possible nor desirable to indicate every information channel or activity within an education system. The criterion for evaluating the significance of any system activity must be the relevance of that activity to the system objectives or goals. As my colleague, R. L. Egbert, (1964) has suggested, a conversation between an instructor and a counselor having to do with a baseball game reasonably can be considered irrelevant to the educational objectives of a school district. On the other hand, it might be desirable for a system analyst to represent the cumulative effects of such incidental conversations since they are likely to constitute "noise" in the system and prevent educational personnel from attaining their intended objectives.

Charts of Information Flow Compared With Organization Charts

Most of us are well acquainted with organization charts; usually we have had less experience with flow diagrams. For purposes of contrast, I have included Figures 3 and 4. Both of these, as well as one or two flow charts I will present later, are taken from the first of a series of reports on a system analysis of a "Continuous Progress High School." I should add that this analysis and these materials all relate to a secondary school. However, for purposes of illustration, I think there will be no difficulty in transferring your thinking from the high school context to that of the college or university.

Figure 3 is an organization chart of the continuous progress high school. It is a typical chart showing the relationship between the school administration and the various departments and the lines of responsibility. Figure 4 is somewhat more complex; it is intended to indicate in a general way some major aspects of information flow in the continuous progress high school.

The continuous progress school that is represented here is different in many respects from the traditional high school in that an attempt is made to individualize instruction and permit each student to proceed at his own rate. This, of course, introduces many complex problems, particularly with respect to student evaluation and to resource allocation and scheduling.

In Figure 3, the academic departments are represented at the far left, each with a department head responsible for coordinating relevant activities and resources. Proceeding to the right is shown a "materials center"—a very important part of the continuous progress school. (Here are housed not only the book store but also such equipment as film projectors, tape recorders, films and tapes, the library, and also a construction area where students, faculty, and staff can build and have built for them various devices that may be required by the course of study.) The third functional unit in Figure 3 as we proceed from left to right is the "information processing center." The information processing center, although often not represented as an organizational unit, is playing an increasingly important role in all schools; as educational institutions become more complex and information records both more complex and more voluminous, the need for more efficient means of storing, retrieving, and exchanging information becomes one of the major concerns of an education system. It also plays a much more significant part in the continuous progress school than in the traditional school. In the continuous progress school, the information processing center must mediate the day-by-day scheduling of students, faculty, staff, space, and equipment, in addition to carrying out the traditional functions of attendance recording, grade recording, and maintenance of a large quantity of information—information that is provided by the administration, academic departments, materials center, the counseling service, by the students themselves, etc. To handle these data, modern methods are required and in a fully implemented, fully functioning continuous progress school, a computer would be essential.

Next to the information processing center in the organization chart is shown the "counseling service." Again, the counseling service plays an increased role in the continuous progress school, as compared to the traditional secondary school, because of the flexibility of the program. Student progress is largely self-determined; students progress at varying rates and more frequent consideration and re-evaluation of student programs is required. Also, a greater degree of individual correction and guidance is demanded. Other essential supporting functions are illustrated in Figure 3, such as the custodial services, buildings and grounds services, business administration, etc.

Turning now to Figure 4, the diagram showing information flow in a continuous progress school, it will be noted that the information processing center occupies the central position. This is realistic, and the implications are important. Information flow is shown as moving toward or away from this center. The roles of administration, academic departments, the counseling service, and the materials center also are suggested by the flow chart. Heavy directional lines, labeled "Policies" are shown as moving from each of these components to the information processing center and are intended to indicate that the policies that guide the activity performers in these organizational units determine much of the nature of the activities of the information processing center. The heavy directional lines moving away from the information processing center indicate reports which summarize information from time to time, show general status of the school, and permit study of status and trends. The flow of certain kinds of detailed information and of information in the form of specific requests and responses is shown by the lighter directional lines which represent most of the day-by-day flow of information to and from the center.

Figure 4 is useful for indicating the kinds of information flow that may be involved in a continuous progress school. The chart itself differs, however, from the usual flow diagrams employed by the system analyst.

Recall that a major interest of the system analyst is to try to trace the flow of information through a system. The flow chart, or flow diagram, is a device for recording the relevant functional relations involved in the operation of a system. It shows activities, it indicates the operational resources or activity performers, it shows the transient information and it indicates the logical situations that control the flow of information through the system.

A Simplified Hypothetical Illustration Of Flow Charting.

I have introduced a chart here, Figure 5, to serve as a very crude illustration of flow charting. I also use it to emphasize how we may move in our system analysis from the study of gross to more detailed systems; Figure 5 suggests how a system may be decomposed into subsystems and detailed analyses made of increasingly fragmented subsystems—provided such subsystems are relevant to the functioning of the larger system of which they are a part.

In Stage I, I have very grossly described the operation of system taken as a whole. This representation of instruction is very abstract indeed. (It is quite similar to the familiar psychological S→R paradigm in the generality of its modeling.) I have simply indicated that there are inputs to the instructor, that (in the middle box) the instruction is planned and executed by the instructor, and that the output from the instruction procedures serves as an input to the pupil or student system. The middle box well could have been shown as a "black box."

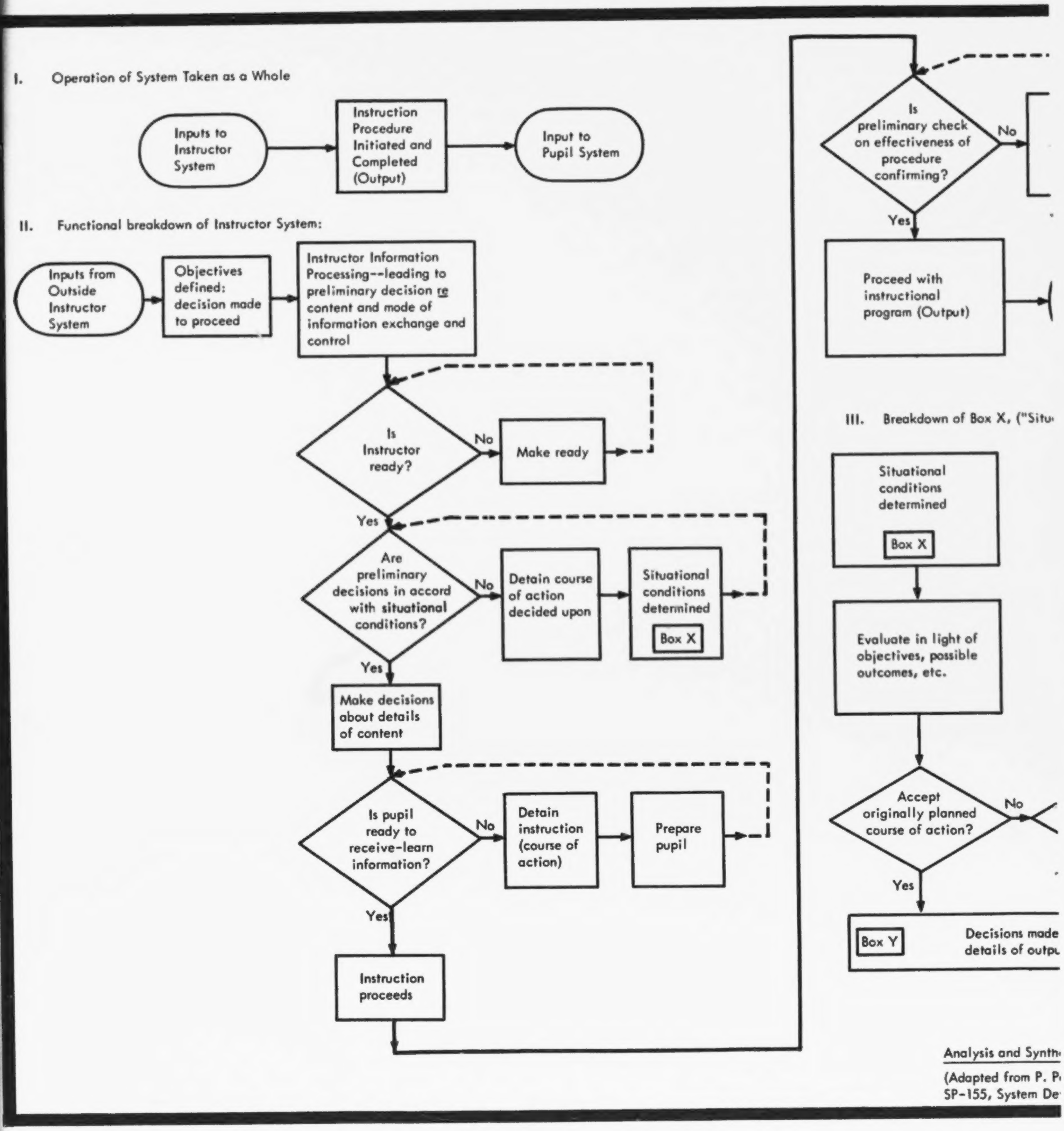
In Stage II, "Functional Breakdown of Instructor System," the diagram still is very general, but it indicates one approach to the breakdown of what may take place as an "instructor system" processes information for forwarding. There are certain inputs from outside the instructor system; in light of these inputs, objectives are defined and decisions are made to proceed; then the instructor proceeds to filter and isolate relevant information for the particular instructional task, to analyze and classify the information, to recall information from his own memory or storage, to recombine the information and synthesize it for transmittal, to determine alternate methods for the presentation of the information and evaluate, to predict the outcomes of the alternative courses of actions, and to reach decisions about the content of information to be conveyed as well as the mode of behavior to be used in conveying it. You will note in the flow charts several diamond-shaped blocks which indicate splits or decision points. For example, one of these carries the question, "Are preliminary decisions (reached by the instructor) in accord with situational conditions?" If the judgment of the instructor is "No," then the course of the action decided upon is delayed while the situational conditions are determined. If the answer is "Yes," then the instructor proceeds to make decisions about the content of the instructional materials.

In Stage III, "Breakdown of Box X ('Situational Conditions Determined')," one of the phases of Stage II (that dealing with the determination of situational conditions) is considered. One way of breaking this phase down into slightly greater detail is shown. Please recall that this is not intended to be an actual flow diagram but only to be very rough and for illustration.

Stage IV considers Box Y ("Decisions Made [by Instructor] about Details of Output") and carries out an analysis in slightly greater detail at this level. The instructor has arrived at certain decisions about the nature of the output (i.e., the content of the information to be conveyed to the pupil and the mode of its transmission), and he then proceeds to consider steps that may be taken as he prepares to program or schedule his behavior for the teaching/learning situation.

Some Flow Charts of Educational Operations

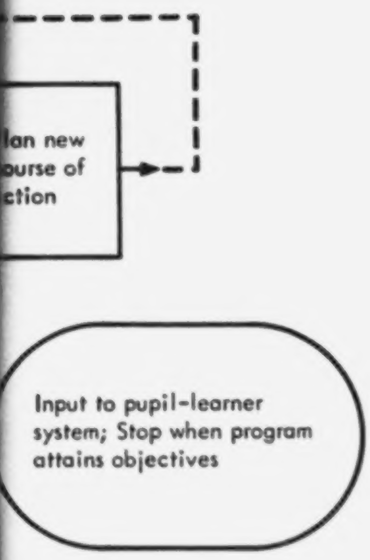
I would like now to turn to three flow charts, or flow diagrams, that were prepared in connection with the system analyses of a continuous progress high school to which I previously referred. Figure 6 is a general flow diagram showing student progress through the school. Figure 7 presents a generalized description of the relationships between the students, the information processing center, and the other school agencies. Figure 8 is a flow diagram of the preregistration procedure in the school. Obviously these are very fragmentary. Some 40 or more flow diagrams already have been prepared and reproduced in documents describing the continuous progress school; this is only a beginning, and the flow diagrams will multiply in number and complexity as more school operations are considered and as each is considered in greater detail. (I do not mean to suggest that system analysis of this sort is a never-ending process. Perhaps it is somewhat analogous to the process the architect goes through as he plans a large and complex structure. Some drawings provide only very gross representations, but the over-all set of drawings which direct the building may be enormous in


I. Operation of System Taken as a Whole
Inputs to Instructor System
Instruction Procedure Initiated and Completed (Output)
Input to Pupil System
II. Functional breakdown of Instructor System:
Inputs from Outside Instructor System
Objectives defined: decision made to proceed
Instructor Information Processing--leading to preliminary decision re content and mode of information exchange and control
Is Instructor ready?
No
Make ready
Yes
Are preliminary decisions in accord with situational conditions?
No
Detain course of action decided upon
Situational conditions determined
Box X
Yes
Make decisions about details of content
Is pupil ready to receive-learn information?
No
Detain instruction (course of action)
Prepare pupil
Yes
Instruction proceeds
Is preliminary check on effectiveness of procedure confirming?
No
Yes
Proceed with instructional program (Output)
III. Breakdown of Box X, ("Situ
Situational conditions determined
Box X
Evaluate in light of objectives, possible outcomes, etc.
Accept originally planned course of action?
No
Yes
Box Y
Decisions made
details of outpu

Analysis and Synth

(Adapted from P. P
SP-155, System De

Figure 5


lan new
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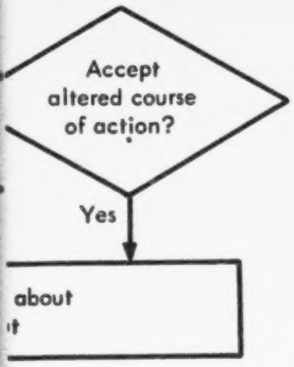
Input to pupil-learner system; Stop when program attains objectives

ational conditions determined":)


Accept
altered course
of action?
Yes
about
t

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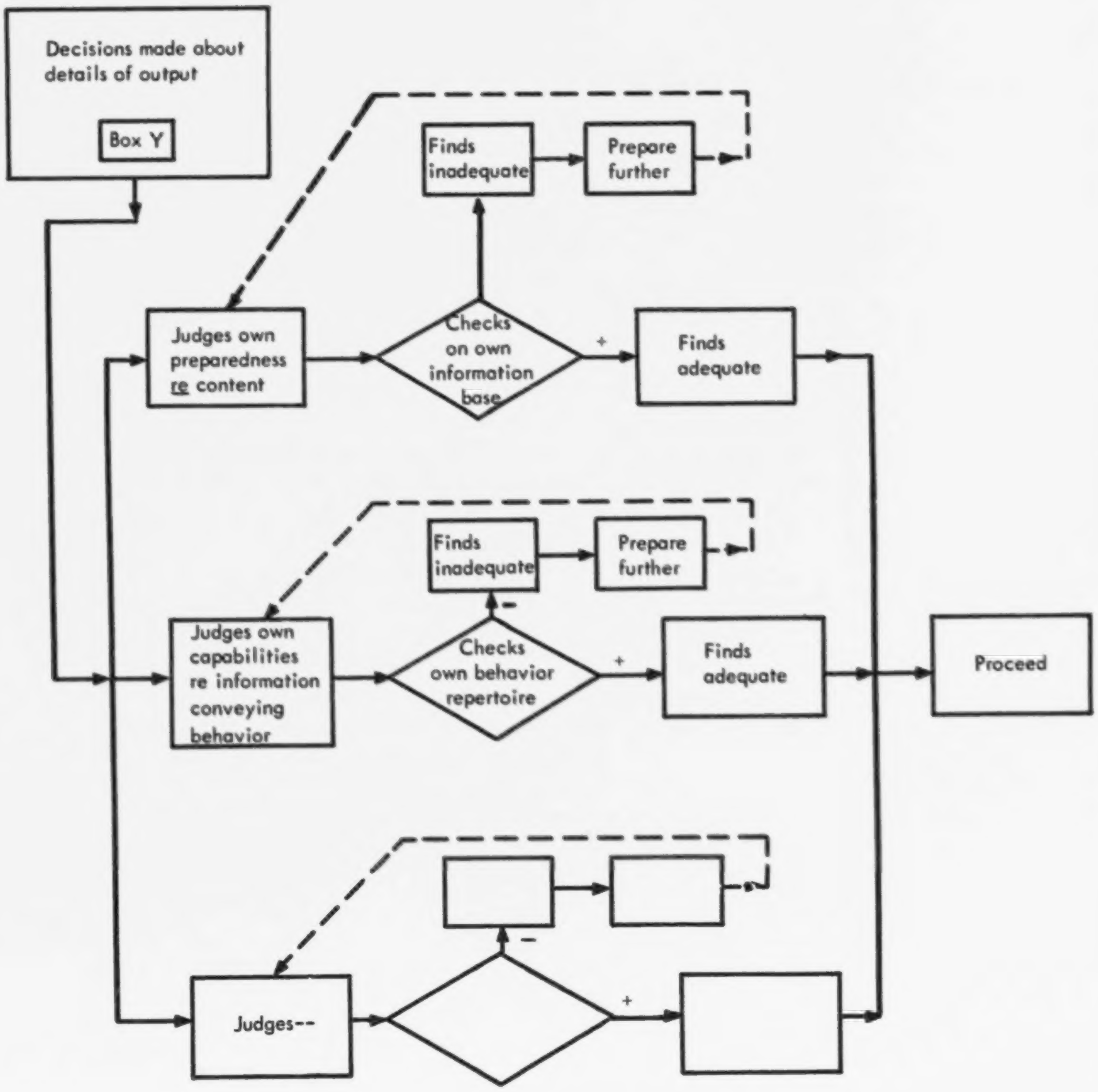
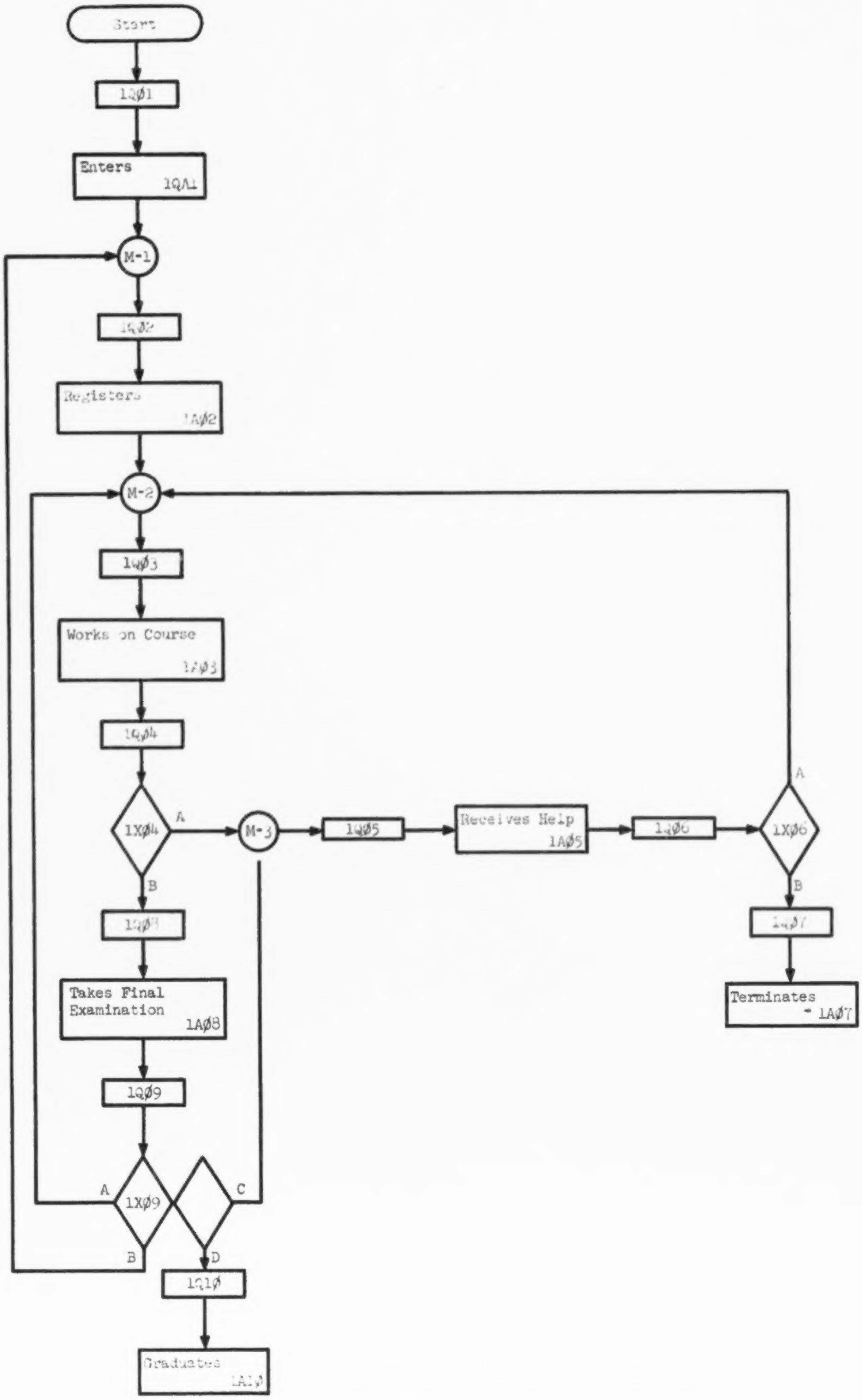
each, "What is System Analysis."
velopment Corporation, 1960.)

IV. Breakdown of Box Y, ("Decisions made (by Instructor) about details of output")


Decisions made about details of output
Box Y
Finds inadequate
Prepare further
Judges own preparedness re content
Checks on own information base
+
Finds adequate
Finds inadequate
Prepare further
–
Judges own capabilities re information conveying behavior
Checks own behavior repertoire
+
Finds adequate
Proceed
–
Judges--
+


Start
1Q01
Enters
1QA1
M-1
1Q02
Registers
1A02
M-2
1Q03
Works on Course
1A03
1Q04
1X04
A
B
M-3
1Q05
Receives Help
1A05
1Q06
1X06
A
B
1Q07
Terminates
1A07
1Q08
Takes Final Examination
1A08
1Q09
1X09
A
B
C
D
1Q10
Graduates
1A10

General Flow Diagram Depicting Student Progress Through School

Figure 6

number, some attending to very minute but necessary details.)

As with most techniques, it is convenient to follow certain conventions with respect to symbols employed in flow diagramming. The particular set of symbols we have employed at SDC in many of the flow diagrams of educational systems with which we have worked are indicated below:

Symbols Employed in One Method of Flow Charting in System Analysis of Educational Operations

First Symbol

1—Student physically present in school operation

2—School operation in which student need not be present

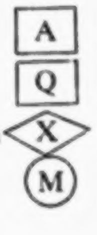
Second Symbol

A—activity

Q—queue

X—split, branch

M—merge



Third and Fourth Symbols

0 to 99—order of action in sequence of activities.

E.g.: $\boxed{\text{1Q01}}$ on a flow diagram of a student applying for admission to a college would indicate that a student was directly involved $\boxed{\text{1}\quad}$; the applications of students would be "queued" in some fashion (perhaps in order of receipt), $\boxed{\text{1Q}\quad}$; and that this was the first action (01) in a sequence of activities, $\boxed{\text{1Q01}}$.

I will not spend a great deal of time going through these flow diagrams. In Figure 6, the student is shown in a waiting line preliminary to entering school and embarking on his course of study (1Q01), being merged with the other students and queued for registration, registering, proceeding to work on his courses, etc. At Split 1X04, those students who need help (Branch A leading to 1Q05) receive it at 1A05; those who are ready for the final examination (Branch B leading to 1Q08) take the examination at 1A08. Following receipt of help (1Q06)—defined to include help from an aide, a teacher, a counselor, or an administrator—the student who was branched to loop A at Split 1X04 is ready either to return to his studies, (Branch A at Split 1X06) or to leave school, moving to 1Q07 and 1A07. At the split following the final examination (1X09) there are four alternatives: Branch C if the student needs help, Branch A if he needs to do more work on this course, Branch B if he is ready to register for another course, and Branch D if he is ready for graduation.

Figure 7 shows the interrelationships between the student, the information processing center (IPC), and other school agencies. The lefthand column closely parallels Figure 6; the middle column shows activities of the IPC; and the righthand column shows how other school agencies fit into the picture.

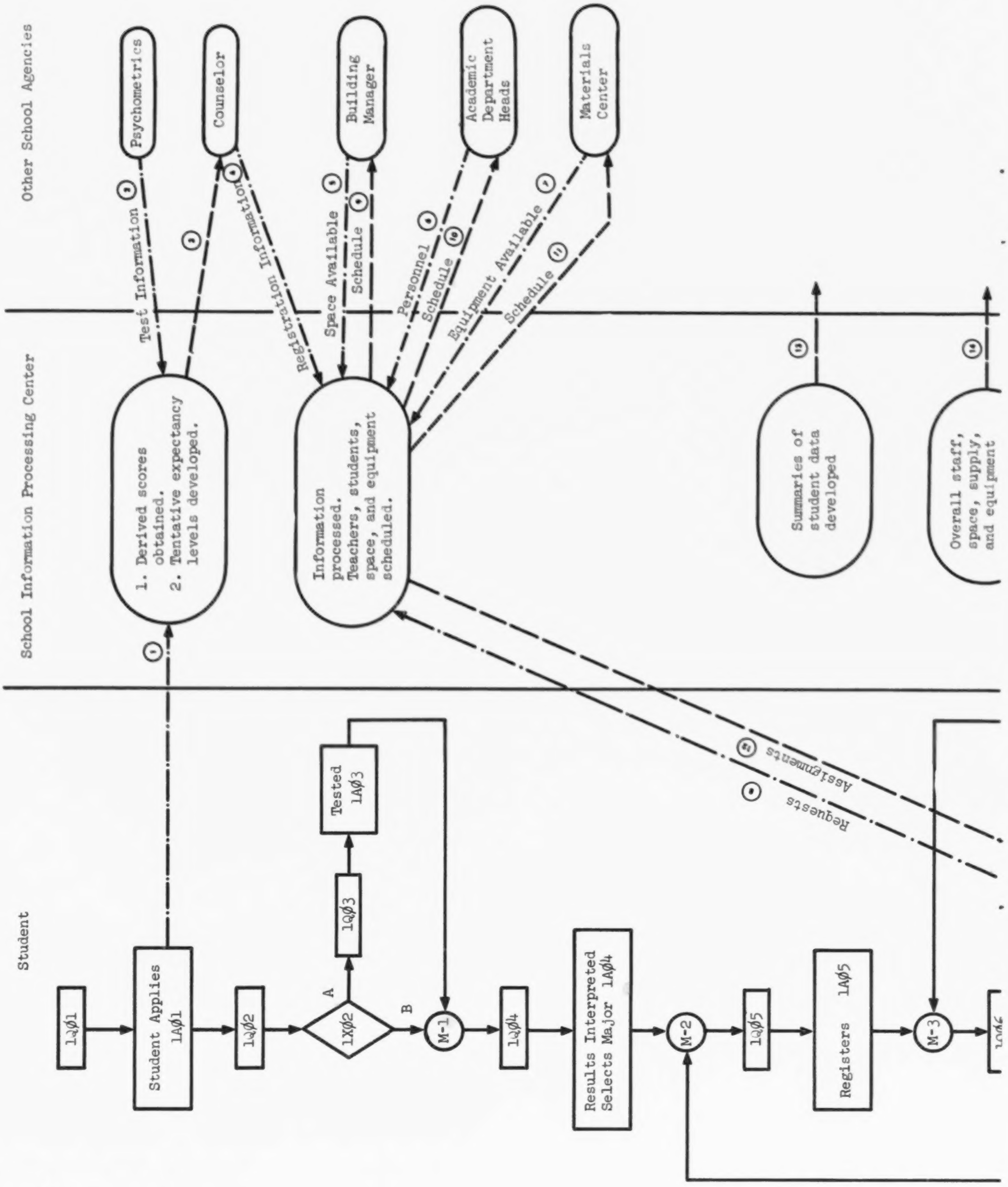
When a student applies to the continuous progress school (1A01), his application ① goes to the IPC. If the student needs further tests—(Branch A at Split 1X02)—he is tested (1A03) by a psychometrician (shown in the far right section of the chart) and the results are fed ② into the IPC where derived scores are obtained and tentative expectancy levels are developed and sent to the counselor.

When his test results are available to the counselor, the student is summoned so that they may be interpreted for him (1A04). The counselor then helps the student to register (1A05), and the registration information is forwarded to the IPC ④. In the meantime, the IPC has received information on space available ⑤ from the building manager, on personnel available ⑥ from the academic department heads, and on equipment and materials ⑦ from the materials center. The IPC combines this information with the daily requests from students ⑧ to provide a schedule. The schedule has a certain amount of stability, but does change from day to day to accommodate the changing educational requirements of students. This schedule, including specific daily assignments, is then sent back to the building manager ⑨, the academic department heads ⑩, the materials center ⑪ and the individual students ⑫.

Based on available information, the IPC also constructs and reports summaries of student data ⑬; develops over-all short- and long-range staff, space, supply, and equipment needs ⑭; and makes and reports such periodic summaries as "number of students registering for Algebra II in a given week" ⑮.

Following registration (1A05), the student works on assigned courses and pursues other activities (1A06). During the time that he is working on courses, his progress is checked ⑯ to determine whether it is at a level and rate that might reasonably be expected from him. Students who need major help (Branch A at Split 1X07) wait in line (1Q08) and are interviewed by their counselor (1A08). If the student and counselor can solve the problem, the student returns to his normal activities. If the problem is not solved, administrative action is taken (1A10) which may result in the student returning to the system (Branch A at 1X11) or exiting from the system (Branch B at 1X11 leading to 1A12).

When a student completes a given course (1A13), the IPC determines whether he is ready for graduation. If the student has completed all requirements for graduation, both he and the appropriate school officials are so informed ⑱, ⑲, and he is graduated (1A15). If he still has courses to finish but does not need to register for additional courses, he returns to



Student
Other School Agencies
School Information Processing Center
Psychometrics
Counselor
Building Manager
Academic Department Heads
Materials Center
1. Derived scores obtained.
2. Tentative expectancy levels developed.
Information processed. Teachers, students, space, and equipment scheduled.
Summaries of student data developed
Overall staff, space, supply, and equipment
Test Information
Registration Information
Space Available
Schedule
Personnel
Schedule
Equipment Available
Schedule
Assignments
Requests
1Q01
Student Applies 1A01
1Q02
1X02
A
B
1Q03
Tested 1A03
M-1
1Q04
Results Interpreted Selects Major 1A04
M-2
1Q05
Registers 1A05
M-3
1Q06
①
②
③
④
⑤
⑥
⑦
⑧
⑨
⑩
⑪
⑫
⑬
⑭

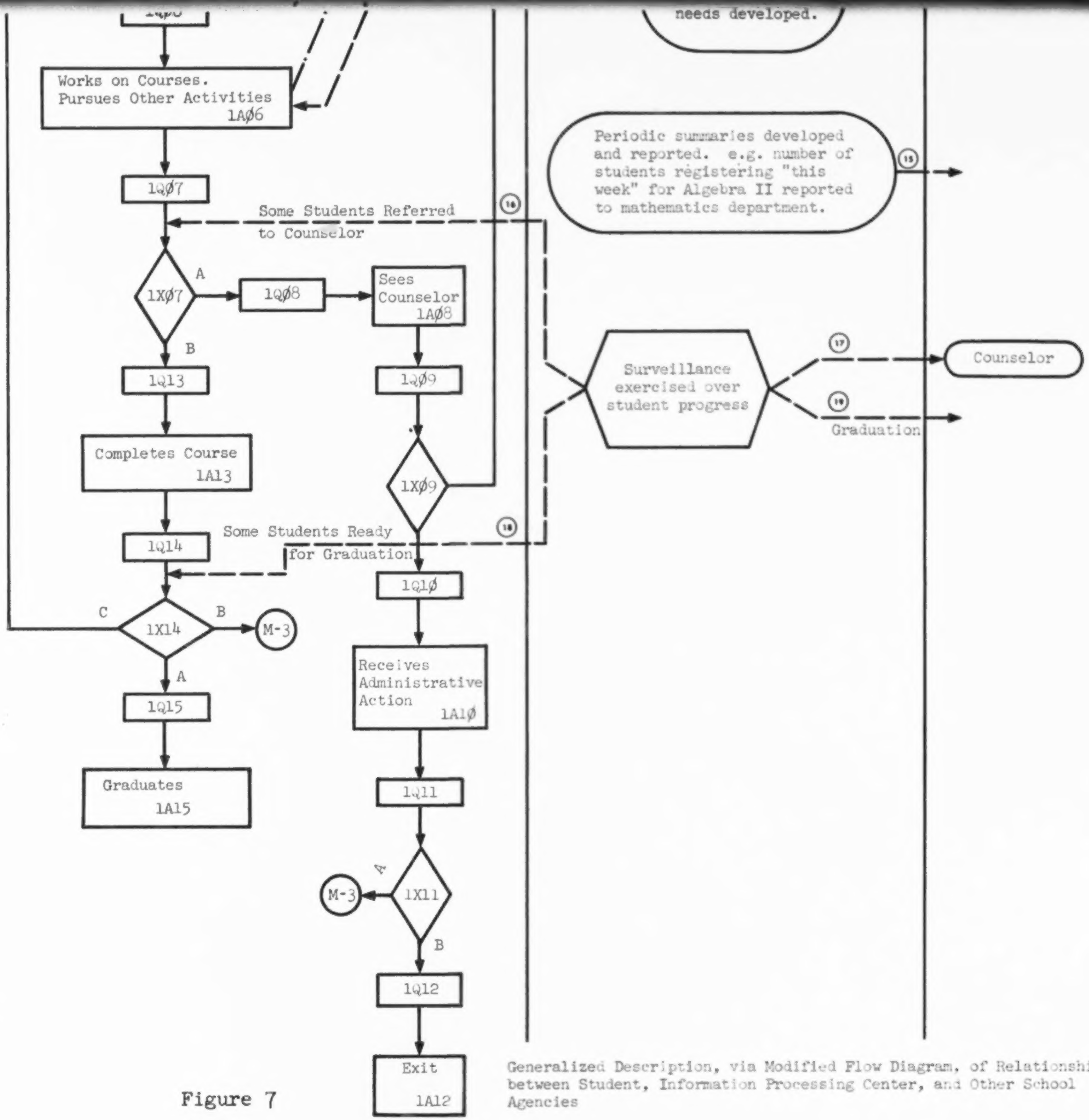

needs developed.
Works on Courses.
Pursues Other Activities
1A06
1Q07
Some Students Referred
to Counselor
⑯
1X07
A
B
1Q08
Sees
Counselor
1A08
1Q09
1X09
1Q13
Completes Course
1A13
1Q14
Some Students Ready
for Graduation
⑱
C
1X14
B
M-3
A
1Q15
Graduates
1A15
1Q10
Receives
Administrative
Action
1A10
1Q11
A
M-3
1X11
B
1Q12
Exit
1A12
Periodic summaries developed
and reported. e.g. number of
students registering "this
week" for Algebra II reported
to mathematics department.
⑮
Surveillance
exercised over
student progress
⑰
⑲
Counselor
Graduation

Figure 7

Generalized Description, via Modified Flow Diagram, of Relationship between Student, Information Processing Center, and Other School Agencies

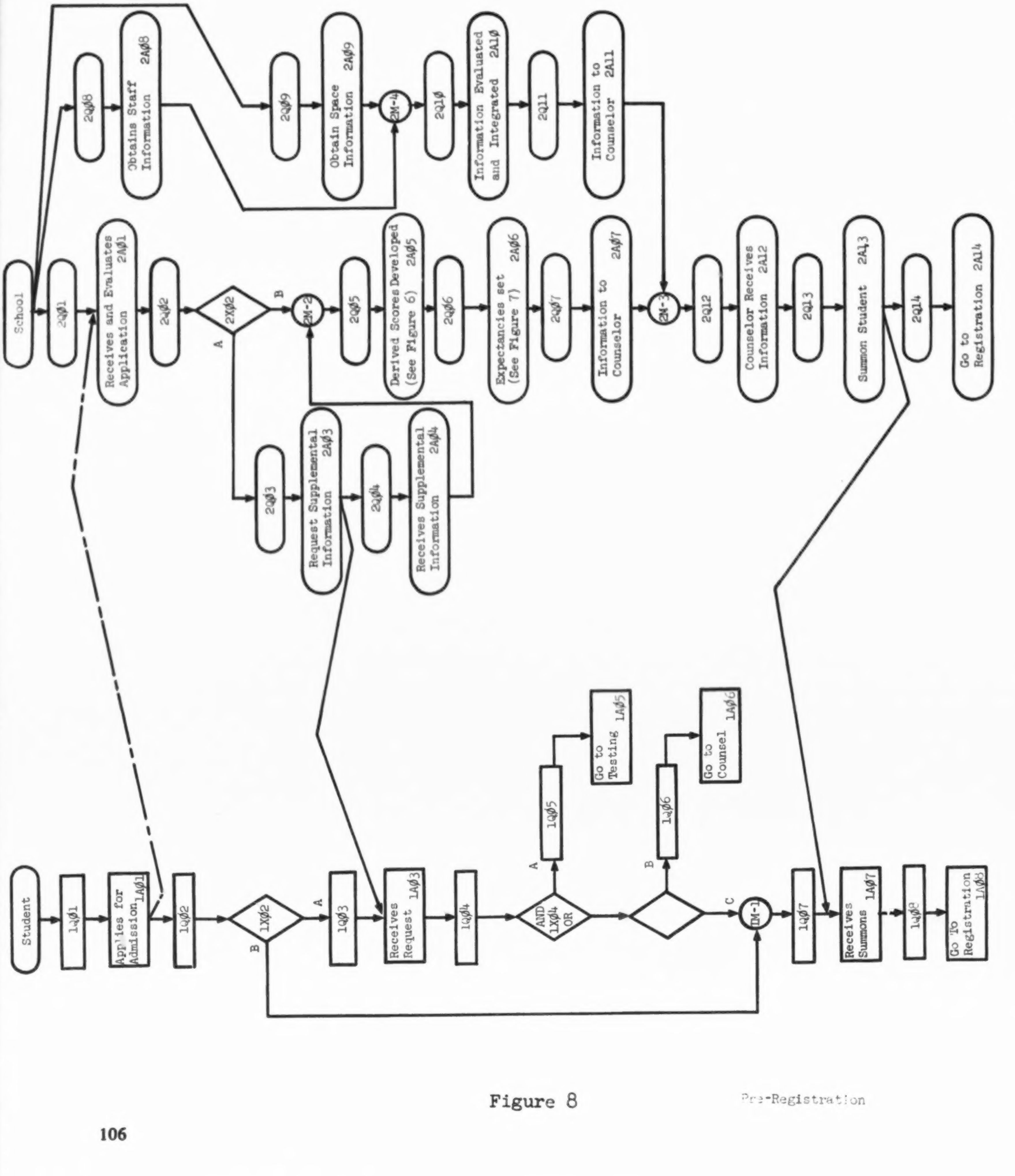

School
2Q01
Receives and Evaluates Application 2A01
2Q02
2X02
A
B
2M-2
2Q05
Derived Scores Developed (See Figure 6) 2A05
2Q06
Expectancies set (See Figure 7) 2A06
2Q07
Information to Counselor 2A07
2M-3
2Q12
Counselor Receives Information 2A12
2Q13
Summon Student 2A13
2Q14
Go to Registration 2A14
2Q08
Obtains Staff Information 2A08
2Q09
Obtain Space Information 2A09
2M-4
2Q10
Information Evaluated and Integrated 2A10
2Q11
Information to Counselor 2A11
2Q03
Request Supplemental Information 2A03
2Q04
Receives Supplemental Information 2A04
Student
1Q01
Applies for Admission 1A01
1Q02
1X02
A
B
1Q03
Receives Request 1A03
1Q04
AND 1X04 OR
A
1Q05
Go to Testing 1A05
B
1Q06
Go to Counsel 1A06
C
1M-1
1Q07
Receives Summons 1A07
1Q08
Go To Registration 1A08

Figure 8 Pre-Registration

work on the uncompleted courses (Branch B at Split 1X14 to M-3 and 1Q05). If he should still register for additional courses, he returns to his counselor, follows Branch C at Split 1X14 and re-registers (1A05).

When a student applies to any school, certain activities are necessary to prepare for his enrollment and participation in the school program. In the continuous progress school both the extent and significance of these preregistration activities are substantially magnified. Figure 8 is a general flow chart of preregistration activities engaged in by the student and by the school. Two strands are shown in Figure 8—one for the school and one for the student. (Rectangular queue and activity boxes are used in the student strand, and boxes having rounded corners in the school strand. These different boxes help to keep the student and school activities separate and permit closer examination of each.) In various places the two strands parallel, feed, and control each other. For example, 1A01, representing the student applying for admission to school, feeds 2A01 in the school strand. This feeding process is indicated by a directional, dash-dot line. Somewhat further along, the school activity block 2A03 (indicating a point at which the school requests supplemental information) is connected by a directional, solid line to student activity block 1A03. This line is intended to imply school-to-student information or control. Some other figures in this report contain arrowless, dashed lines which connect activity blocks from the two strands and indicate parallel activities.

Figure 8 gives an overview of preregistration activities. The student is shown applying for admission (1A01). The school then receives and evaluates the application (2A01). If adequate information is not available (Branch A at school Split 2X02), supplemental data are requested (2A03). Students from whom more information is required (1Q03) receive requests for such information (1A03) and report for testing (1A05) and/or an interview at the counseling service (1A06). Supplemental information is provided via testing and/or counseling (2A04).

When sufficient information is available, the IPC derives scores on the students (2A05), sets tentative expectancy levels (2A06), and forwards this information to the counselor (2A07).

In the meantime, the IPC has received staff information from the academic department heads and space information from the building manager (2A08) (2A09). It has evaluated and integrated this information (2A10) and now reports available staff and space to the counselor (2A11).

When the counselor has available to him student, staff, and space information (2A12), he asks the student to report for registration (2A13). When the student receives this request (1A07), both student and school are ready to register (1A08 and 2A14).

These flow charts are at the same time very sketchy and also very complex. Obviously they could be improved upon and the operations made more explicit (all I have used are "first approximations" which will be extensively revised by the investigators as the research proceeds). But I think they give us an impression of the complexity of system operations and interactions in educational processes and the need for detailed analysis and description as we plan improvement of the educational activities and services. The design of education systems must, to maximize achievement of educational objectives, take seriously into account detailed descriptions of information exchange of the sort illustrated by these kinds of charts. It must take into account the efforts of the system analyzer to understand and operationally define the objectives of a system, its elements, and their interactions. Such charts help the analyzer to make explicit the necessary conditions and details for the functioning of the system; ultimately, they help him to note elements, conditions, and gaps in information flow and phasing that may have been overlooked, to suggest additions, deletions, and rearrangements of elements and their communication network and phasing to improve the system operation, and to suggest changes in output that will permit better matching of the system output with the intended goal or objective of the system.

System Design

For our purposes, system analysis has been simply described as the observation and recording of the essential elements and operations of a system and how they work together when a system is functioning.

The objective of system analysis is to provide cues and suggestions leading to system design or to system modification or re-design. The ultimate purpose of theoretical models and of research and analysis of systems is to apply the knowledge gained to the design of a new system or the revision and modification of a system so it may operate more effectively.

All of this is easily said. System design, however, is by no means simple. Nor is it well understood. An insightful statement on system design by Dr. Ruth Davis (3) of the Department of Defense suggests one reason discussions and attempts at the design of information systems are less productive than they might be is because of the ambiguities associated with the very phrase "design of a system;" what is being designed is never clearly understood by the parties involved.

When a person wants to build a house or make some alteration such as adding a room to his existing home, he may have some very general ideas about the features of the structure and the functions he would like to have it perform. But often these provide little direct guidance to the architect or designer. As a result, more frequently than not, the homeowner finds that the new structure that is built or the modification that is made falls short of his expectations and a common comment is, "If I were doing this over again, I would want this or that." But he was not able to forsee his own expectations clearly enough at the beginning, or if he did, the architect was not competent in incorporating those ideas in the design. I am sure this has been the experience of many of us with respect to college and university buildings.

The point I am trying to make here is that the objectives must be clear before the designer can do even a minimally acceptable job; and if the requirements *are* clearly stated, a great deal depends upon the competence of the system designer from the standpoint of his acquaintance with existing systems (derived from system analysis), with theory, with models, with research in the area, etc.

Earlier, in relation to the objectives of system analysis, we pointed out that system study, preliminary to design, may be undertaken in some cases to provide for the establishment of an organization of a system so that it will perform some assigned function and in other instances to introduce a change within an organization of existing means for performing some assigned function. Some design starts from scratch; frequently, however, design involves change in an already existing system.

Churchman (1964) has referred to one of the major tasks faced by system designers by the very apt term, "housekeeping." He points out this is an activity engaged in by many designers (including housewives) which resolves itself essentially to "When you see a mess, clean it up!" If a boy owns a puppy, he comments, there is little point spending time cogitating about the purpose of boys and dogs before you get down to the business of getting things cleaned up. Irrationalities creep into all systems and disrupt affairs in awkward ways, and by "housekeeping" Churchman is referring to system design that is intended to straighten out something that is wrong with an existing system; the over-all goals of the system remain invariant and the designer simply works on parts that may have gotten out of order. The question of what the system is all about is not raised in such cases.

Churchman goes on to point out that in large systems housekeeping is very important, but that it is seldom simple. Analysis is required before one knows what steps should be taken. Churchman cites an example of the housekeeping type of design problem familiar to all of us—the problem that exists during registration week at a large university when there are long lines of students waiting to register in courses or to be advised by members of the faculty. How can the system be changed, or what kind of housekeeping can be accomplished, to alleviate this problem? A number of possible solutions may occur to the responsible individual; most of them carry additional problems along with them. For example: If more persons are employed to register students, what will the university do with them after school starts? If "occasional" employees are used for the task of registration, how can we expect them to know the details competent advisers must know of the university system? Many similar questions could be raised. Churchman suggests that this particular problem could be looked at from the standpoint of four components: the cost of the units required to service the registration lines; the cost of students being kept waiting; the probable time and frequency of arrival of students for service; and the probable time required to service each one. If reliable evidence on each of these four aspects were available, the system designer probably could decide whether an existing system really was functioning satisfactorily or not, and if not, where design modifications might be attempted. In approaching this housekeeping task, one does not raise the question of whether the present manner of registration is really desirable. Present policy is accepted, and the system analyst goes to work to determine whether the policy is being implemented efficiently. The responsible designer must keep in mind that long waiting lines at registration time may not be an irrationality, especially if there seems justification for estimating students' waiting time at low cost. (Churchman, whose principal interest is operations research, suggests, as did Mood in the statement with which I began this discussion, that the need for estimates of this kind often requires statistical analysis and mathematical models to help determine whether an irrationality really occurs.)

Continuing his discussion of design modifications, Churchman goes on to list some of the opportunities currently available to educational institutions. He notes particularly the "new brooms" that computers and mathematical analysis supply. He calls attention to the fact that education operates by means of elaborate files (e.g., student record, student backgrounds, faculty records, faculty salaries, documents, etc.). The file is a storage of information from which one may retrieve information in some usable form and within some reasonable period of time when one needs it. (My earlier comments on the increasing importance of the information processing center in education systems and their significance for the complex education systems of the future relate to this same point.) For such purposes it seems likely that computers can do the job better than humans alone and, at the same time, relieve people of the monotonous aspects of file storage and retrieval. In this housekeeping change, the general purpose of the file is not changed; the housekeeping simply involves introduction of a computer file which provides faster and less costly ways of storing and retrieving the necessary information.

Having stated the principle of housekeeping as "When you see a mess, clean it up!" and having given illustrations of housekeeping design, Churchman proceeds to try to phrase the principle more precisely so it may be useful for systems study. He suggests that housekeeping design may be accomplished on three levels (with admittedly greater difficulty of interpretation of the meaning at each successive level). On the *first* level, procedures are present that clearly interfere with the system's operation and that no one in the system really wants. An outside observer frequently is able to make an analysis which will suggest ways of correcting the defect—and usually he will find no difficulty in gaining acceptance of his recommendations. At the *second* level are procedural difficulties that are more complex, such as those that lead to long delays, to inadequate services to students or faculty, to ineffective assignment of personnel, etc. Here, system research procedures and techniques, or application of mathematical methods of linear programming may suggest more effective ways of operating that will not effect the over-all system but will improve its operation—and that may gain fairly ready acceptance. At the *third* level Churchman mentions procedures that may be inadequately carried out in the system because of lack of knowledge of advancing technology. Here introduction of the newer technology may play an important part.

I mentioned earlier that at System Development Corporation we have a so-called computerized classroom where, depending upon the errors a student makes in progressing through an instructional program, the computer directs the student to items of study and, step by step, through the unit of instruction. We also have begun to use computers as an aid to student counseling, taking advantage of the computer's large storage and rapid retrieval capacities. We use computers, as Churchman has suggested, for problems of class scheduling and faculty and space assignment in the school. Of course, nowadays it is becoming commonplace to use computers both in the business office of a college and also in connection with registration and grade recording. These kinds of use of the computer for information processing are the kinds of design changes Churchman is talking about when he suggests that changes may be made in the system by the application of new technology as it becomes available.

I want to return for a moment to Dr. Ruth Davis' comments on design. In noting the range that systems design may take, and also in trying to specify operationally what is meant by system design, Dr. Davis suggests (1) a maximum set of actions that may be involved in the design of an information system (including reorganizations and reallocations of the staffs for which the design is being accomplished; realignment of lines of communications and information flow; redistribution of missions and functions; and reallocation of staff resources) and (2) a minimum set of actions which may be accomplished under system design (namely: description of the organization involved; isolation of some problem areas involved in the system operation; and recommendation for a further set of actions that may be expected to change the system's operation).

I want to add one further bit of information provided by Dr. Davis. In one section of her paper Dr. Davis presents what she calls a "primer" of information on system design techniques, and in her comments she points out that the entire task of system design can be expressed by a single sentence which she calls "the system design sentence." By application of this system design sentence to considerations of system status, system unknowns, and system outcomes, an evolving system design can be evaluated and the discrepancy between it and acceptable design determined. Davis' system design sentence reads:

1. WHERE, WHEN, WITH WHAT, AND WITH WHOM
2. YOU MUST ACCOMPLISH
3. WHAT, FOR WHOM, AND WHERE.

The items appearing in the first clause (where, when, with what, and with whom) have to do with the location of the user of the system, the time at which the system is operating, and the available facilities and personnel.

The "what, for whom, and where" under the third clause have to do with what must be accomplished, for whom it must be accomplished, and where it must be accomplished—i.e., with the objective or outcome of the system in mind.

These items appearing in clauses 1 and 3 represent properties of the existing system being dealt with; they are inherent in the system and are merely awaiting discovery and documentation. The system designer must always work within a context of the conditions indicated under clauses 1 and 3.

In connection with the second clause, "you must accomplish," the system designer may determine *his own set of design elements,* such as "with what," "with whom," "when," and "how." (With respect to the dependence of system design upon system analysis, it should be noted that an incomplete system design will result whenever one of the system properties or elements under clause 1 or clause 3 is not discovered; and, also, an inadequate system design will occur whenever one of the properties or elements under clause 1 or clause 3 is known but inadvertently or deliberately ignored.)

I might add that although Dr. Davis' paper is written from a context of military problems, particularly those of command and control, it would be of interest to most administrators of higher institutions because many problems in the two areas are similar and the transfer from one area to the other is not very difficult.

A Hypothetical Example of System Analysis and Design

I hope some of you have read Porter's SDC publication (1962). This little statement illustrates many of the problems associated with system design and ways of meeting those problems. The purpose is accomplished in a partially humorous fashion by relating a parable of a president of a large chain of short-order restaurants who had attended a lecture on "Human Relations in Business and Industry" and had heard the speaker discuss the many pressures that create human relations problems. The president of the restaurant chain had his human relations problems with personnel and the lecture set him to thinking about how he might approach them. He came up with the idea of calling in a group of consultants (consisting of a psychologist, an anthropologist, and a sociologist) and having them discuss the problems with him and his top management staff. In general the mission assigned the scientists, or system designers, was: "Find out why the waitresses break down in tears; find out why cooks walk off the job; find out why managers get so upset that they summarily fire employees on the spot," etc.

Each of the consultants gave serious thought to the problem, came up with an explanation of the causes, and offered a solution. They all agreed that the problems usually occurred under "stress"—during rush hours in the restaurants, or when there were special pressures that were being exerted upon personnel. The psychologist attempted to explain this in clinical terms involving the manager of the restaurant as a father figure, the cook as the son, and the waitress as the daughter—the whole problem involving sex rivalry. The sociologist thought it a matter of status conflict involving the manager, cooks, waitresses, bus boys, etc. The anthropologist interpreted these problems with regard to value conflicts.

Regardless of the possible explanation (and to make the parable a good one) each of the consultants from the three different disciplines came up with a similar idea of how to solve the problem—the so-called "spindle." The sociologist referred to it as a wheel on a shaft placed on the order counter so that the girls could clip their orders on the wheel rather than calling out orders to the cook. The psychologist described essentially the same device. Similarly the anthropologist suggested that by having a wheel at the top of the shaft and putting clips every few inches apart, the waitresses could put their orders on the wheel and not have to call their orders out to the cook.

So, with the possible "reasons" for the problems in the background, the restaurant manager tried out the idea of the spindle with which we are all acquainted in short order restaurants today. This was a problem of system design.

Porter goes on to explore the functions served by the spindle. First of all, it acted as a memory device for the cook who no longer needed to remember the orders given him by the waitresses. This made his job easier and less stressful, especially during the rush hours. Second, the spindle acted as a buffering device. It buffered the cook against an overwhelming overload of orders. Ten waitresses could place their orders on the spindle almost simultaneously. The cook took them off the spindle according to his work rate—not according to the input rate. This made his job easier and more within reach of his human capacity. Third, the spindle acted as a queueing device; it held the orders in proper waiting line until the cook could get to them and it also did all the "standing in line" for the waitresses, since they didn't have to stand in line to pass an order along to the cook. Fourth, the spindle permitted visual display of all orders waiting to be filled. The cook could often see that several orders called for the same thing and could prepare four hamburgers in about the same time as he could prepare one. By having random access to all orders in the system, he was able to organize his work around several orders simultaneously with greater efficiency. A fifth function served by the spindle was to transform information. Printed words appearing on the menu were spoken by the customer in giving his order to the waitress, the waitress made written notes of the spoken words, and the cook transformed these spoken words to the physical form of prepared foods. This is an example of "information flow" of which we spoke earlier.

Obviously, a number of problems were solved by the spindle. Errors are bound to occur but now the dispute over who may have "goofed" was not one of mere opinion and accusations. There was a written record and not only could the record establish the source of the error, but it also could provide "feedback" to both waitress and cook regarding errors. Also, as errors were examined under conditions of feedback, new designs for the order system were suggested. Maybe abbreviations or similarity of letters caused random errors, such as confusion over HB for hamburger and BB for beefburger. The cook and the waitress got together with the manager and changed the name of the beefburger on the menu to Caravan Special, with the new symbol CS which could be transmitted with less ambiguity and easily distinguished from HB.

So a number of the problems of the restaurant were solved with the spindle, most of these having to do essentially with the problem of "information overload" and ways of handling that overload. One of the ways in which the overload was handled was to increase the number of channels of communication, or channels of handling the information. Perhaps the spindle was in itself not enough, but further attention to the problem might have led the restaurant manager to put more waitresses and cooks on the job to handle rush hour loads. The Post Office has extra help before Christmas. The telephone system introduced automatic switching equipment to handle heavy communication loads so that when a load gets to a certain point additional lines are automatically "cut in" to handle the additional calls.

Just increasing the number of channels is not enough in system design. As we already have observed, another adjustment process is that of queueing or forming a waiting line. The spindle performed this function in the restaurant. In education there are innumerable examples of queueing where it is necessary for some matters to wait while others are being taken care of. Sometimes this is accomplished by the simple process of handing a number to each person who is to wait in line as he enters the office or requests a service.

Another kind of adjustment that is suggested by Porter in his restaurant story is the process of filtering of information. (This adjustment was not related to the spindle.) The hostess in a restaurant jots down the size of a group that is waiting to be served and she can then selectively pull groups out of the queue according to the size of the table last vacated. Similarly, the Post Office handles registered mail before it handles other mail and it delivers special delivery letters before it delivers other letters. In education, some problems take priority over others, and decisions must be made regarding the filtering process that will take place.

Porter goes on to note that the operation of a system sometimes can be modified so it will better attain its objectives by permitting "omissions"—simply rejection or non-acceptance of an input. The dial system of our telephone gives a busy signal and rejects a call. A manufacturing organization may reject an order it cannot fill within a certain time. In the restaurant example, the menu may carry the words "No substitutions" with certain meals—instead of rejecting customers, the restaurants restrict the range of inputs they will accept in filling orders. This also cuts down the waiting time in the queue.

Still another time-saver in the restaurant system is a design adjustment process that is sometimes referred to as "chunking" or aggregating. Large amounts of information sometimes can be advantageously grouped together, or aggregated, by predetermined arrangements; thus one may find menus so printed that the customer may simply ask for an order by number. "Approximating" is a procedure that is somewhat akin to the chunking process. The registrar of a university may not be able to make an exact count of the number of students who will enroll for the Fall semester, but he may predict confidently an approximate number, or range, that will permit effective planning. Projections of finance, faculty requirements, student enrollments, and all similar extrapolations are examples of approximating.

A final kind of adjustment that Porter mentions in connection with the restaurant example is that of "trading errors." In this case the system design calls for a deliberate making of errors of one sort in order to prevent the making of errors of another sort during the rush hours. When the work load is low there is no particular problem if three people ordering hamburgers each want different variations of embellishments. During rush hours it would be easy to make errors. So suppose the cook simply prepares the meat course and the waitress brings to the table a tray containing bowls of potato chips, a lettuce leaf, a tomato slice, a piece of carrot, a cup of relish, and a cup of mayonnaise. In most instances she will have brought something that the customer didn't order and in this sense she will have made an "error" but she will have avoided the error of not bringing the customer what he did want. Similarly in the Post Office, the sorting of mail is not checked during rush periods; although mail that is mis-sent must be returned, the risk is worth the cost and more mail gets sent where it is supposed to go, even though there are more errors. In a college curriculum we may deliberately reduce the number of courses that are offered by a department, but in so doing we try to retain those courses that are required or are most in demand. At the same time, we may permit independent study to permit individual students to acquire specialized information necessary for their purposes. Many of us think highly of individualized instruction; yet the economics of education force most institutions to adopt a plan for teaching large classes of students on a semester, trimester, or quarter plan. Here we are trading errors. Perhaps the system could even be improved by a design change which would permit students to accomplish some individual work (perhaps remedial in nature) or gain some background information by self-instruction through the use of programmed lessons and units. Or, as one of my colleagues points out, the college might be organized like a typical ski school. Here students begin in the same large class. After the initial period of instruction the classes are reformed on the basis of accomplishment of the student skiers. It is a sort of ability grouping and is a compromise between individualized instruction (which would be very time-consuming) and large-class group instruction.

System Study and Long-Range Planning for Higher Education

My last section is brief and essentially is a quotation from a presidential address I gave several years ago to the American Educational Research Association. I had been trying to point out that there were shortcomings in both research and practice in education and that at least some of these shortcomings might be overcome, or substantial improvement brought about, if educational practice were to take a view which encompassed long-range systemic educational planning, development, and research.

Essentially I was trying to say that education should make projections and approximations of what might be expected in the future, that it should approach its planning on the basis of *systems study* and with a view to the interactions of education systems with other systems in the environment, and that this planning should be undertaken on a systematic basis rather than proceeding on the haphazard, "fence-mending" basis from which we now appear to operate in education.

In concluding I am going to repeat several of the comments I made in that address:

1.) Educational planning should take a long-range look to the future, just as the military establishment has been forced to do—a future ten or perhaps twenty years hence, or maybe even further ahead.

Such educational planning must of necessity be interdisciplinary, for life and our needs cut across the narrower aspects of existence. We must consider scientific, social, economic, and other needs. The thinking toward advance planning for education must be contributed by outstanding minds and imaginative thinkers in the fields of economics, science, government, sociology, psychology, and, of course, professional education.

2.) Educational planning must, in order to be effective, take a *systemic*, over-all look at (a) the intricately interacting educational process systems and subsystems (instructional, administrative, etc.), and (b) the closely related scientific, economic, and social systems and subsystems.

Long-range educational planning must employ the systems approach and must not only scrutinize each of the myriad of components, or details, involved in instructional and administrative processes, but also see them as a coordinaed, interlocking, and interacting system.

3.) Educational planning and conceptualization must take a careful look at, and undertake intensive analysis of, the important components, or subsystems, of educational systems.

We need not only the over-all systems study approach but also intensive study of the significant subsystems.

4.) The results of advance educational planning should be subjected to careful research and tryout.

First, the ideas and developments should receive alert exploratory study. Then, they should be carefully researched and adequately tried out in the laboratory and in the field before the new developments and ideas are implemented in any ongoing educational program—at least, on any large scale.

Such a procedure means both exploratory determination of the significant variables or compounds contributing to learning and educational practice, and systematic and critical research into the ideas growing out of advance educational planning. We must identify the important subsystems (aggregates) that are important to practical school situations, and then conduct carefully designed research (involving both laboratory simulation and field tryout) to test the ideas proposed and new techniques developed.

5.) Before implementing educational ideas and new developments in a wide variety of situations on a large scale, exploratory study, laboratory simulation, and field testing should be extended and evaluated in full-scale operations involving broad educational programs.

The techniques and procedures should be tried out with adequate replication to determine those that are widely applicable. Such study should be conducted under closely observed conditions—not necessarily experimental conditions, in the narrow sense of that term, but under conditions which permit appropriate evaluation of practices prior to their wider application.

6.) After ideas have been properly researched and tried out, if they are found to be worthy and practicable, it is imperative that they be communicated—that they be made readily available and that their implementation be encouraged and urged.

To implement such advance planning and research, I suggested that special centers should be established. The purpose of such a center would be to provide a facility, interdisciplinary from the standpoint of staffing and thinking: (a) for the accumulation of economic, social, scientific, and educational information concerning resources and potential future needs; (b) for making such information readily available to provide teams of scholars with the background and basis for developing ideas to meet the educational needs of the future; (c) for providing appropriate facilities for researching and evaluating promising ideas about instructional, administrative, and support procedures, methods, and materials; and (d) for the dissemination and demonstration of new procedures and materials—in short, a facility that would look toward a planned-for educational future of the United States and its areas of influence.

Such a center should employ both a systems and a components approach. It undoubtedly would employ some of the techniques now practiced by school systems in conducting building surveys, in school population projections, and in attempts to introduce innovations suggested by educational philosophers and curriculum planners. But the plan would go beyond such approaches in both extent and methodology. It would involve detailed systems study and analysis; it would pursue, critically and systematically, ideas that seemed to hold promise; it would research and try out ideas before introducing them into the field (that is, into educational practice) on a large scale; it would employ simulation (laboratory and computer) and field tests.

It would look toward the future needs of America and of the world—economic, scientific, social, and the like—and work toward the building of educational systems and subsystems (instructional systems, administrative and support systems) that might meet the anticipated needs.

It would keep abreast of developing trends and would engage in the continuous collecting of scientific, economic, sociological, governmental (national and international), educational, and other information pertinent to resources, manpower, and the anticipated needs of the future.

It would be interdisciplinary in that it would employ scholars from many fields working as teams and taking an over-all view of what education can and should do to meet the interlocking needs of different disciplines and areas.

It would study the overlap and interactions of educational systems and other systems, would analyze relationships, and would adopt an heuristic approach, actively seeking modifications and innovations that would facilitate the operation of instructional and administrative programs and, in general, enhance the achievement of the goals of education and of society.

It would engage in the projection of possible or probable trends in education.

It probably would engage in building models and theories with respect to education, but always with a view to testing the models and theories against adequate criteria stated in terms of defined values and goals.

It would engage in the development of new and improved materials, methods, and procedures hypothesized to meet the needs of education ten to twenty years hence.

It would explore and evaluate, through careful research and field tryout, new concepts, procedures, materials, and techniques to determine their adequacy for meeting future needs before introducing them to general educational practice.

It would be equipped with adequate facilities for the storage and rapid retrieval of practicable ideas, methods, materials and procedures.

It would be equipped to disseminate and demonstrate new materials and procedures of given worth—it would take leadership in implementing new developments in education.

This forward-looking planning and associated systems study and attention to system interactions I consider to be the most important of all possible concerns of education today. Such study constitutes the central issue that should be engaging the attention of our nation's best minds and leaders, both in education and in other disciplines. It is, in my opinion, an imperative for higher education as we plan for the future.

Selections from the Discussion

We view the application of simulation as a research problem. We're trying to develop a technique by which we can build a model of any school system and build into the model all of the characteristics that we feel are important, such as student population, programs, resources available to operate the school, the way in which students go through the school; the amount of time it takes for them to do certain things; the alternatives that may occur in their process as they go through the school. We want to be able to characterize all these things and then run the computer and keep track of students simulated going through the schools, using up resources, using space, teachers, materials, and operate it so that we simulate their going through in time. We also build into the program record-keeping procedures so that we can get a print-out after the run of what has happened to the students, to the resources through time. We hope that this will give us a great deal more insight into what occurred in the school—give us a school that we can use for design by just changing the model and saying what if we use a different resource here, what if we arrange the procedure differently so that instead of doing this first we'll do this; what if we took resources from here and used them there, would this solve a problem that seems to be created; and run the school again with the changes and look at the data that we get out of it and see whether or not we've been able to solve problems by making modification of design. The ultimate test of the technique is whether the kinds of predictions we make really in fact turn out to be true in reality and the validity of whatever we get out of the procedure is dependent entirely upon what we put into the model; our assumptions must be valid. We hope that we have a technique that will allow us to think more capably about complex systems where there are many variables that are interacting with each other simultaneously and a technique that can carry us beyond our present capacity to think about these kinds of things. It seems that if we can demonstrate that we can make some worthwhile predictions, some findings demonstrating validity with this school at the secondary level, then this would provide a basis for saying it ought to be explored with other types of problems . . . problems of advance planning where there are many variables that you want to take into consideration and whose interactions you quickly lose sight of. This kind of technique might be quite useful just as a tool for thinking about advance planning.

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Dr. Ryans has indicated that he knows of no system, or no university or college in the United States which has really taken a total systems look at itself. I think this is largely true.

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There are roughly 33,000 school districts in the United States of which something like 400 have some kind of computer or electronic computing equipment or punch card systems of some kind.

I can see where systems analysis has a technique for taking a very hard, comprehensive look at a system within a system. For example, if you're talking about the admissions office, certainly the admissions office of a university or college is a very definite system by itself, one sub-system in the total university or college. You can say, well I'm going to design a system of information handling for the registrar and the admissions officer and if you establish the parameters you have indeed a system for that particular purpose. However, if your larger purpose is to design a system which will not only meet the needs of the registrar or admissions officer but a system of information about the students, for example, which will not only meet the needs of the registrar and admission office but also the deans of the various schools, the teachers or faculty members, the board of trustees on a very generalizable level of detail, then you have to take a total system look, not just the registrar's look. You have to include the registrar and the counseling people, the faculty and various levels in the system who indeed are also part of the system. When we say take a systems approach, it depends on what system you're talking about.

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At the university level, practically every university or college that's fashionable has a computer. And the typical approach is not a system approach . . . but to establish a need in the budget for a computer and then decide what to do with it after it arrives on campus. And the typical users are mathematics department or engineering department people who do know the value of a computer for fast computation, but there are many other applications of computers that you could use if you forgot the hardware for the time being and took a total look at not only its place in the program but the research program and also the administrative needs. When you've decided what the requirements were for all these, then you would specify the kind of hardware that you would need and be able not only to satisfy the people who have research projects but also people who have administrative problems, such as the admissions office, registration office. The scheduling of students is only one of the applications—but if you just do that and design that system and lock it in concrete, then you may miss the needs of other people who have the same types of information. If you don't take a systems analysis viewpoint, if you don't take a look at the total needs of many individuals at the college or university level, then the danger is of procuring hardware too soon and in not meeting everyone's needs, not meeting as many needs as possible. I think in the area of higher education this is virgin territory not only for computer simulation but for a whole wide gamut of applications of computers —I'm not here selling computers; we don't make hardware. I think that you people in operational colleges and universities are going to see in the next ten years a remarkable trend toward the use of computers in information technology for planning. If Dr. Cogswell's model turns out to be valid, does in fact enable the educator to make better decisions about implementing innovation, then it seems to me very logical to go at a higher education system and offer to develop a model which would represent in effect the major substances within a university or college and then be able to introduce some variables and look at the college operation and see what happens when you introduce certain changes. To be specific, it seems that a college dean or financial officer, or whoever has an interest in this problem would like to know without actually implementing or trying it, the effect of a trimester or four quarter plan on the university in terms of a number of variables, in terms of the cost, in terms of the implications for recruitment of staff, what it means in terms of students, what it means in terms of a whole number of questions; if you have a model to which you could turn and introduce a trimester or four quarter plan before you introduced it into the system and got answers to these kinds of questions, how much it would cost, how many more faculty members or how many fewer faculty members would you need, what does it mean in terms of budget five years from now—these are very practical questions—I certainly think this aplication doesn't exist yet but I think it's within the state of the art. This kind of management information as to what effect changes in the school year have can be played with in terms of a model with some quantitative data on what this would mean. I certainly think it's also important to our management type, board of trustees, president and his chief officers to be able to examine some other problems, for example, the preparation of a budget.

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Higher education offers a very fertile ground and almost virgin territory for applications of systems analysis or systems approach and it would include modeling and design implementation of information systems to do a better educational job.

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There's one point on which there may be some confusion and that is that the full diagram representing this continuous progress school involves a great deal of design; in other words, these are not representations of the way in which this system is functioning; our analysis does include how we think things ought to operate in addition to the way they are and the idea of information processing center is a design idea. We have formulated in detail—we have a document with the specifications—what we call one of the functions in the information processing center which we call Prevalence and Detection of Function and the idea of this particular processing function is to more or less increase the consciousness of the school in terms of its sensitivity to students. It takes influx on the student progress, it takes influx on information on whether the students come through particular obstacles that they are supposed to go through, whether they have completed particular activities planned for them, takes information about their activities, of the contact with teachers, about their group activities, etc. Plans would require that influx be collected on these on an ongoing basis and the computer would automatically analyze the influx and compare them against the stored criteria that determine whether or not students are in difficulty and then the system would also alert appropriate personnel so that they could take action when a problem arises rather than after it becomes progressively more serious. We have formulated in detail the flow for such a system and we hope within the next few years to be able to try to actually program this in the computer, use specifications and code up the system and develop it in the laboratory trying out some of the data collection procedures and communications problems and then try to operate it in the school and evaluate it.

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In regard to counseling, we're working on this. This is another sub-system. For a long time we've been interested in seeing how much and what the counselor does. His analyzing of the cumulative records and making judgments about the students' educational plans, etc. is probably something we think is rather routine and that it needs to be studied and made explicit. We also think a lot of what the counselor does in helping the kids register is something that could be handled automatically and so we've studied one counselor, collected a lot of data on his performance in his task of interviewing the student and also as he thinks out loud analyzing the cumulative record, and we are at this point in the process of programming the logical rules that he uses in analyzing the record. We feel that we probably can automate something like 90% of this particular task which would mean that you would take the data in the cumulative record and put it in the computer and get a detailed analysis of every student, pointing out those students who are having difficulty, and form hypotheses about their difficulties and about the direction they ought to consider educationally and vocationally.

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A large secondary school has the problem of assigning students to classes and teachers to those classes, and various systems based on ability are now in secondary schools, and this becomes a very complex problem by manually tabulating the student requests for classes and teachers' backgrounds to measure up to those particular needs, so the whole area of secondary school scheduling is one that is making rapid development. We do have one program at SDC that was developed at Palo Alto. We're trying to match available students' time to educational resources. It's just a nice way of saying we're trying to put students into classes they need to take and teachers in those classes who are qualified to teach them during a period of time which they must have those particular classes. So it isn't as simple as it sounds, dealing with a school of 2,000 students, especially if you have accelerated programs. It certainly lends itself to solution by computers. Now at the college level, this program is operational and there are some technical problems in the sense that it was written for a 1401 computer and not everyone has a 1401 computer so we had to send problems from one computer to another. This is a question of modifying that program to fit another computer, but this is a technical problem . . . not insurmountable. I just mentioned the secondary school application as an example of an existing program and I'm sure you're probably familiar with Harvard's program for the same purpose. There is the New England School Development Council which schedules something like 40 school districts in that area and they are all scheduled on this program with about 90% non-conflict situation, meaning that the students are scheduled and remain scheduled as the computer performs it, 10% of which then have to be manually scheduled because of problems and a number of human factors. This is a pretty good saving in manpower since most secondary principals and guidance counselors and some teachers spend most of the summer, sometimes the entire summer, making up the schedules. This is a waste of professional time and which can be done by computer technology.

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One way systems approach or systems analysis can help education in long-range planning is in the area of computers. I'm not saying that computers are the whole substance of formal education in higher education, but I think the one practical illustration of how they can help, for example, is in the state system which is concerned with computer acquisition over the next ten years and is concerned about the utilization of computers in a state-wide system. They might consider the possibility of taking a total "systems look" at the state-wide system rather than the individual needs at each institution as a separate entity; instead of buying a computer for each college as the requests come in to do as they please, or at least to make some small applications of the computer, it might be a feasible idea in planning to take a total look at the state-wide systems need in terms of teaching, research, services and administration. All the administrative functions that are involved in this entire state are looked at in terms of these functional needs. Then the institution is looked at—the particular institution. I mean there are some institutions which are small, there are some institutions which are teacher training institutions, there are some that are universities and have schools of engineering and law, etc. Now the needs of these obviously are common but different and so by taking a look at an individual need and taking a look at their plans for computer acquisition and for applications of technology, you might very well come out with a better long-range educational plan, not only to get the most for each dollar invested, but in terms of improving the total educational program in a state system rather than in just one institution. This is a broad level of abstraction, but it seems to me a very logical common-sense approach to developing a state-wide system for computer acquisition and utilization. And this I certainly think lies in the area of long-range planning and I certainly think systems analysis and systems approach to this serve a certain purpose.

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We're building simulation vehicles so that we can characterize any high school system that we want to describe. It's a flexible tool—and we're building computer programs that allow us to set up a table in the computer which characterizes each student in the population. We give him a number so we can identify him and keep a history of what happened to him. We assign a code to represent him. We also assign a code to represent his age, his I. Q. and anything that we want to characterize—personal variables, motivation. Then we characterize the sequences in the curriculum by coding the computer to represent the sequences of events and while a student is studying in a study carrel, we take a code number representing that student, place him in a register in the computer and hold him there while a clock symbolically progresses or cycles, and when the instructions in the computer say at the end of such and such a time that he'll be done with his activities, he is sent somewhere else. He goes there and a record is made of this. This is happening to all the students who are going through it, so it's basically a logical description of what happened. All we put into the computer is what we believe does happen to all students. We try to think about all the logical possibilities, the kind of output we get through the early stages when we're building a set of computer programs that summarize the things that are happening in the modeling of the school. For example, we can get a history of all the activities of each student which we call a tracer. We can get a print-out which describes every time that anything happens and shows us how many people are in each activity at that time. As time progresses we can see where people are going in terms of a load or the kinds of output which will result.

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We know of no actual situation where an institution of higher learning has been engaged in system analysis so we can't really speak about how effective and what the results would be.

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Resources for Planning: A Resume

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My assignment is that of summarizing the sessions of the past several days. From the outset it seemed logical that this be done within some kind of framework. One might, for example, weave the threads together by discussing the *need* for long-range planning in higher education. An alternative would be to recapitulate the discussion around the *nature* of planning. A third possibility would be to review all that has been said concerning the *steps taken* in planning—the "how" features of it. If it is assumed, however, that planning is needed and that it will be carried on, at least to some extent, and if it is assumed further that the "how" features of planning are dependent upon a multiplicity of variables, it seems logical to use a different dimension as the focal point for this final discussion, namely, the resources for planning. Such a dimension would appear to have the advantage that it can include almost anything and that no planning can be done without the involvement of people, devices, ideas, and data, all of which come under the category of resources.

Perhaps it is well to start with two assumptions that were implied throughout the conference. The first is that long-range planning is underway in many colleges and states. The second is that such planning is becoming increasingly essential. In fact, there probably would have been no conference on the subject had neither assumption been true. That American higher education is beginning to inquire about its future seems clear. In the opening session President Babbidge, in raising some questions about planning *per se*, suggested that the establishment of institutional and educational goals is more important than the mere act of planning. Interestingly enough, almost every speaker emphasized the importance of establishing goals as the first step in planning. Several speakers urged that the goals be made sufficiently operational so that planning can be more specific than is possible when they are merely stated as generalities. This particular emphasis is undoubtedly one which should be highlighted. I shall refer to it again later.

In considering resources it seems appropriate to review first the aspects of higher education for which long-range plans are made. Obviously, the entity of higher education could be considered either from a micro- or a macro-point of view. If we choose to view it broadly, we may look at all higher education in the state and consider the nature and methods of planning and coordinating a system of higher education. If a more narrow view is taken, the questions concerning planning may be concentrated on individual institutions or, for that matter, on specific facets within institutions such as the curriculum, admissions, facilities, and finance. Obviously, the two points of view are interrelated since individual institutions are part of state systems and, in the final analysis, one purpose of planning at the state level is to strengthen the ability of the individual units to discharge the functions which they assume. Attention has of course been given in this conference to planning at both the institutional and the state levels.

One way of categorizing planning resources, either for individual institutions or among them, would be to classify them as either internal or external. If internal, they would be an inherent part of the structure for which planning is being done; if external, not part of the structure but borrowed or employed from the outside to assist in planning. Another possibility is to classify resources by types. These may be divided into two groups—those that are people or agencies, and those which may be regarded as data, concepts, or techniques, any or all of which lend power to the planning process. Perhaps these categories can be made more explicit in the following discussion of planning at the local and state levels.

Planning in Individual Institutions

Let us turn now to planning in individual institutions. We must remind ourselves that there may be planning for many different facets of the college. Sometimes the planning for each facet is done separately and independently, and other times a master plan is developed for the institution as a whole. The case of Southern Methodist University is a good example of the latter. Perhaps we should recall the warning inherent in Dean McHenry's quotation from Winston Churchill that "First we mold our buildings and then they mold us." This comment, it seems to me, reinforces the premise that the first step in planning is the determination of educational objectives. In these days of stress on the need for sufficient facilities and finances to accommodate an unprecedented number of students, fiscal and physical planning could take place at the expense of academic planning and the continuing evaluation of institutional purposes.

Be that as it may, we now face the question of the resources available to institutions in their planning. First, what are the resources within an institution itself? Running through the various discussions at this conference was the expressed or implied idea that both administration and faculty should be involved in planning. This would suggest that among the human resources, those who are intimately identified with an institution should have the potential for making the greatest contribution with respect to planning for the future. They must, of course, be involved in the establishment of institutional goals. The matter of determining how best to achieve these goals is only one step beyond.

Having stated a rather obvious premise, the question arises as to the relative role of administration and faculty. President Babbidge suggested that the planners are the leaders. Perhaps we should say that the leaders are the planners. In any event there seems no doubt that the president and his fellow administrators bear a heavy responsibility not only for initiating long-range planning in their institutions but also for seeing that it goes forward and, once complete, is implemented.

There were some differences of opinion expressed during the conference concerning the role of the faculty in planning. When Mr. Cuthbertson suggested that the faculty not be exposed to the details of planning, it may have been because he was speaking primarily about financial planning. It would appear possible that in too many institutions the administration sees long-range planning as its responsibility alone and thus minimizes the involvement of other staff members. Human resources as well as ideas are normally scarce and it would seem important that the more the talents of staff members can be harnessed through some type of representative system, the better off an institution will be in charting its future course.

Understandably, the problem of how best to utilize the faculty in planning will vary with the size and complexity of the institution. The more complex the college or university, the greater must be the reliance on committees or senates which often are far removed from individual faculty members. But even here, it would appear that the faculty should be kept fully informed of institutional problems and plans.

Rather surprisingly, the papers read at this conference have paid little attention to external human resources such as individual consultants, management firms, accrediting agencies (both regional and professional), and regional agencies such as WICHE and CIC. Whether this was an overt omission or whether such aids did not seem relevant to the development of the particular topics is perhaps not important. The fact remains that these external services are used extensively. I should like to return to the matter of their use a little later.

So far we have spoken almost exclusively of people and agencies as resources for institutional planning. While we cannot divorce individuals from the more general category mentioned earlier which included data, concepts, and techniques, it is important that the latter resources be considered. First, let us think about the value of research data as a resource. Naturally, any group of planners will make use of whatever information is at hand, but whether it is of the scope and depth to be maximally useful is always open to question. Data of the type usually needed for planning may come from three sources: local institutional research, basic research (often inter-institutional) undertaken with other objectives in mind, and various types of studies made by outside agencies.

An excellent statement on institutional research and planning was made by Loring M. Thompson of Northeastern University at the second annual National Institutional Research Forum (1962). It reads in part:

> In the broader sense of the term, university planning involves not only the physical campus but also the long-range goals and objectives of the institution, the nature of its educational programs, the kind of students sought and the impact of its programs upon these students, together with the resources (funds) needed to conduct these programs and the means of acquiring these resources (tuition, grants, government appropriations, and fund-raising). Decisions on goals, programs, or fund-raising are strategic decisions of the institution. The decision as to whether or not to seek sponsored research, for example, is a strategic one. It will have a substantial impact upon the type of research on the university campus, the nature of its faculty, and therefore the nature of its students and its future enrollment.
>
> At present, bureaus of institutional research have made few studies related to broader strategic questions such as this. But the university planner must answer these questions, implicitly or explicitly, in his physical plans. If the planning is to be a rational process, then it

> begins with the determination of long-range goals and objectives, followed by identification of the educational methods to be used and the facilities required. Here the planner may readily become involved in pre-planning studies. His area of interest overlaps that of the institutional researcher. Whether the total effort is to be termed institutional research or planning will probably be determined by historical accident. What is important is that the knowledge of modern physical and social science be applied to the analysis of major problems facing the university.

And, later:

> As institutional research and planning gathers momentum, it should be able to deal not only with problems encountered in the operation of current programs, such as enrollments and schedules, but also with more basic problems of adolescence, motivation, and of learning. It should be able to make long-range studies and come to grips with methods for teaching creativity as well as academic excellence. It could make long-term studies of the whole educational process so that it can be better designed to give the younger generation a sense of initiative, responsibility, and maturity.

You will recall some varying opinions expressed or implied in the conference about the organizational structure for institutional research within institutions. Whether it should be entirely centralized or at least partially decentralized is perhaps a matter for each institution to decide. Surely, however, a guiding principle would be that the research should be responsive to the needs of the entire institution and that no bureau or research unit should become so autonomous that it performs only those studies which its staff alone considers significant.

The complexities of higher education today suggest that in addition to the more typical studies done in individual institutions, there is increasing need for more basic research data which more often than not will emanate from research centers in major universities and special research agencies. The research suggested by Dr. Ryans in his conference paper is a case in point. Several of the studies about to be completed at the Center for the Study of Higher Education hopefully will yield data that will be useful as guidelines. These include research on the impact of college on students, the performance of transfer students, and the factors associated with various patterns of college attendance.

Martin Trow has dealt with the role of the social sciences in planning for higher education in a paper read at a Symposium on Undergraduate Environment in 1962. Trow pointed to the fact that the mere availability of research data does not guarantee that decisions will be made on a more realistic, objective, and reasonable basis, primarily because of politically relevant factors that intervene between research and implementation. In making a plea for social research in institutions he says:

> . . . If social research is done within a framework of given ends and purposes—say, that of maximizing formal academic achievement and success in graduate school—then insofar as those ends are in dispute in a given institution, the research will be defined as a political act and resisted as such. Where it is not so defined, a basic educational issue is being begged and social research is helping to beg it. But there is another role for social research in education, one that I hope the present extension of basic research in colleges and universities will strengthen. That role is *not* to enter *directly* into educational planning, disguising our preferences or someone else's as expertise, but rather to contribute to clarity, to what Karl Mannheim called substantial rationality, to intelligent insight into the connections between causes and consequences and an understanding of the inter-relations of events. While social science cannot tell us, "what we should do and how we shall live," it can help us to see more clearly the connections between what we want to achieve and how we are going about it. It can help, above all, by forcing us to confront inconvenient facts—that is, facts that are inconvenient to the views and opinions we currently hold.

The citation may be regarded as an illustration of what I have referred to earlier as the term "concepts" as a resource in planning. Surely in the future we shall rely more heavily on the behavioral sciences for guidelines in decision-making.

Only limited mention has been made in this conference of technological devices that have appeared fairly recently on the horizon as instruments of planning. One cannot enumerate, much less evaluate, the technological aids that are now available. The Junior College District of St. Louis-St. Louis County, has just announced what it calls a breakthrough in the use of the computer as a means of paring the costs of construction on its three new campuses. The news release from the district reads in part:

> A St. Louis breakthrough in college planning and financing was revealed by the Junior College District as it unveiled its $40 million master plan for three new colleges, one in St. Louis and the others in the St. Louis County communities of Kirkwood and Ferguson. The computers at the McDonnell Automation Center, which have been used to simulate earth orbit and rendezvous of space vehicles, were employed to simulate the operation of a new college before it is built. The expected programs of each of the 4,500 students, the number and size of planned instructional spaces, available faculty, and various time patterns for class scheduling were fed into the computer. In less than 30 minutes, the computer produced a complete college schedule that indicated what percentage of a 45-hour college week (8 a.m.-5 p.m., Monday-Friday) the college's instructional spaces—lecture halls, classrooms, shops, and laboratories—would be in use. Different arrangements and schedules were tried until the computer produced a schedule that would meet the Junior College District's

> goal. A college program and buildings to house it could be designed to insure that expensive instructional space would be in use 80 per cent of the time. In contrast, many existing college campuses operate at a utilization rate of only 30 to 50 per cent of a 45-hour week.
>
> The new college's high utilization rate meant that fewer classrooms, lecture halls, laboratories, and shops would be required in the new campus than in other community colleges with similar enrollments. A survey of three other institutions with enrollments of about 4,500 showed that they had an average of 142 instructional rooms. The new college, in contrast, would require only 80.

It is to be remembered, of course, that technological devices are only a means to an end and that they are dependent upon ideas that are still the prerogative of man to develop. On the other hand, in these days of high speed computers and all that they represent, the potential of mechanical devices for planning now and in the future must be reckoned with.

Planning at the State Level

The earlier volumes by Moos (1959) and Glenny (1959) document the attendant problems in planning and coordinating higher education within the state. If we agree with them, and also with the statement which Arthur Browne made at this conference, who can deny that this level of planning and coordination is one of the most complex issues of our times? If this be true, what are the resources for guidance at this level?

Presumably, these resources will not differ materially from those used by individual institutions. It could logically be expected that representatives of the institutions involved and of the governing boards of those institutions would be high on the list of participants in state-wide planning. Likewise, it should be assumed that state planning should be based on adequate data within a conceptual framework that would offer guidelines for direction in accordance with society's needs. It is at this level, of course, that at the state level political factors exert influence and that legislators and state officials have a tendency to get close to the planning scene. It is also true that planning agencies at this level rely heavily on their own technical staff for initial planning, since this is one of the staff's primary functions. Whether this is good practice depends not only on the calibre of the staff but the extent to which checks and balances are made operative between the staff and its board and between the planning board and the individual and collective units in the system.

Whatever the degree of coordination, it surely is logical that each state assess its needs in higher education and, by looking objectively at the total job to be done, determine the most feasible and economical way to accommodate its college population. More often than not, I suspect, this will suggest the distribution of students among various types of institutions with undoubtedly some differentiation of function among institutions.

Some General Principles in Planning

Throughout the conference there seemed to be certain basic principles that were frequently expressed or implied. The following list of these principles is not meant to be inclusive but is merely representative of the thoughts expressed by the leaders and participants.

1. While a "master plan" is not sacred in the sense that every institution should have one, it is essential that each college develop some type of guideline in order to make certain decisions about the manner in which it will meet the inevitable problems and pressures in each 5 (or more) year period ahead.

2. There is probably an optimum time period for which planning should be done. The period cannot be so long as to preclude reasonable accuracy in projecting statistics and trends, nor can it be so short as to make planning meaningless.

3. Plans must be flexible enough to allow for change, yet rigid enough to encourage action. The dangers of overplanning may be as great as those of underplanning.

4. Planning should be deliberate, with provision for adequate time and money to be invested in it. It is not a weekend affair.

5. Planning at any level should be within the context of current and projected social and economic characteristics of the state and nation. This includes consideration of such factors as long-term occupational trends, advances in technology, and like matters.

6. Planning should also be done with a view to developing the social and economic resources of the area served by the college.

7. Emerging trends in the patterns of college attendance are important factors in planning for higher education at either the institutional or state level.

8. The initiation of planning should be the responsibility of individual colleges and systems of higher institutions. The matter should not go by default to governmental agencies.

9. Planning in regard to determining institutional purposes must be done from within, with outside help (if needed at all) limited to technical assistance.

10. There must be consensus among those who make and those who implement plans. This argues for faculty and staff participation in institutional planning and for institutional participation in system planning.

Some Questions and Concerns

As in all social movements there are serious questions to be raised about long-range planning and how it gets done. The questions are less concerned with whether planning is or will be underway, and more with the basis on which it is to be done.

One of the major questions concerns the extent to which, if at all, an evaluation is to be made of planning that is done. A state or, for that matter, an individual institution develops a master plan. Who knows whether, after a two- or three-year period, it is really functioning? Did the data on which the plan was based prove to be valid? Was the advice of the consultants, if any, sound? Evaluation is obviously difficult due to the problem of measuring what the plan has accomplished. If, however, the plan was based on specific goals and objectives, the determination of whether these are being accomplished should be possible. The important factor is that evaluation be attempted.

Another set of questions centers around two practical as well as philosophical questions in modern society. One of these is the basic question of who shall be educated beyond the high school and by what means. The other is concerned with the economics of higher education. Obviously the questions are related. There is a growing acceptance of the premise that most high school graduates should be given an opportunity to continue their education. Yet each year the trend toward selective admissions is accelerated. Also, each year there is talk about requiring the students to pay a higher percentage of the costs of college. These trends appear to be somewhat incompatible. Moreover, despite the extensive amount of work done on the costs of college, fund raising, and other operational problems in connection with financial support for higher education, and despite astronomically increasing budgets for higher education, little serious discussion and study is being devoted to the problem of just how, from the point of view of economics, the United States is to support its program of higher education over the years to come.

A third major area of concern has to do with the kinds of data needed for adequate planning. There will probably be no difficulty in obtaining "status quo" projections of enrollments and unit costs over time, but are there not other major considerations? Among them are some mentioned in other papers: the climate of the institution and its impact on students with varying characteristics, the perceptions of high school students and their teachers about individual colleges, the changing patterns of college attendance, and the extent to which educational objectives in colleges are attained by students.

Likewise, there arises the question of whether planning must always be based on periodic massive surveys or whether it is possible for an institution or a state to keep information flowing so that decisions can be made on a continuing basis.

There remain also many questions concerning the use of individuals and agencies outside the college in planning. What role does the consultant play, even if he comes from the field of higher education, and what are the pitfalls in his use? Should management firms be used—for what, when, and how? Should regional compact agencies play a greater role in planning? Should accrediting agencies devote more time to assisting in the self-improvement of their constituents?

Presumably, too, the question should be asked whether higher education can learn something from the planning carried on in business and government, even after allowing for the differences among them in hierarchical arrangements. The question is not meant to imply that business and government have far surpassed education in planning. In a sense their problems are not as complicated. But might we learn from them, just as they might learn from us?

Implications

Finally we ask that 64 dollar question: what does this conference add up to insofar as impact is concerned? Certainly no magic wand has been waved and doubtless no souls have been saved. No prescriptions have been written nor have any hypotheses been tested. If, however, those of us present have felt anew the necessity for long-range planning, if we have acquired a few ideas that are applicable to our own situation, and if we have made a resolution of some kind, we presumably have profited. Each of us has to ponder all this alone.

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Selections from the Discussion

The value judgments are the steering wheels of our institutional vehicles and planning is the motor of driving forces that we use—but they are both a part of the same vehicle and I think we have to be very careful that we don't get a driving force in one part of the institution and the steering wheel in another part, without any correspondence between these two things, and this is the one thing I think that a dean constantly looks to.

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I'll choose to argue with my faculty in these confrontations (1) that a part of the university is committed to the idea of unity in knowledge—in short I am on Mr. Babbidge's side relative to this particular issue; (2) that such a commitment requires a faith in the supporting inter-relationships among the fields of knowledge—I can see them developing conflictingly independent of each other; (3) that such faith allows for the making of valid judgments concerning the balance within the institution—undergraduate work and graduate work—teaching and research—science and the humanities—somehow if there is any concern about the validity of the unity of knowledge it seems to me that our value judgments must concern a balance among some of these parts. Value judgments are always there—whether they are brought to a level of consciousness or not. My concern as a dean seems to me to be to help raise to a level of consciousness the value judgments which we already hold and to bring about a constant dialogue that will result in the kinds of value judgments we want. But I would like to suggest further that this dialogue must be not only within the university, among the various departments and colleges that make up the university, but the dialogue must also be with society at large.

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I am a firm believer in the idea that educational policies are public policies, whether it is educational policy within a private university or within a public institution. The public always has been concerned and always will be concerned in a democratic pluralistic society.

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I would like to assert that administration, and most of us are involved in administration one way or another, is politics whether we like it or not, and I think that the quicker we recognize that we are engaged in politics, the more apt we are to be able to really do something about the planning that we are talking about, and I'm using politics in the best sense of the word here. Our society is certainly interested in the application of knowledge—but I'm not at all sure that it is as interested as we are in the creation of that knowledge, and this is one of the dialogues that I think is a necessary one—the different points of view between the institution and the larger society regarding the creation of knowledge and the application of knowledge. The university cannot deny the accumulation of knowledge—that is, the accumulation of knowledge that we sometimes call knowledge and sometimes call wisdom. Policy recommendations are quickly transformed into political issues. The minute that you get a recommendation to a place where somebody has to take action on it, it is no longer a recommendation, it is no longer a plan, at that point it is a political issue and we are politicians who can veto, who can consent, who can implement, who can sabotage. This is all politics whether we think politics exist in our institution or not.

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A year ago as a freshman regent I attended an AGB (we have our trade association too) group of regents in Dallas and there was one session entitled "When to put your nose into and when to keep your cotton-pickin' hands off of". Since that somewhat frightening experience, and one year later, I have concluded that a regent has three prime roles. First, I think he must be a catalyst and believe me this conference has sharpened my catalytic points. Next, he must be a buffer, a buffer between the president, administration, public and legislature. After this week I think I can run much better interference and more knowledgeable interference. And third, I think a regent must be a public, and particularly the legislature's potential customer.

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The challenges ahead for higher education are so great that we must utilize to the maximum the potential of all connected . . . universities and colleges . . . administrators and faculty—yes, and even the regents and trustees—the job ahead calls for real team work, for mutual understanding, and constructive questioning and needling by the members of the several echelons of higher education personnel.

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Regents and trustees must acquire a greater knowledge and understanding.

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I think we must accept and use leadership potential no matter what the source—students, faculty, administrators.

An institution is kind of like a human being—it has certain needs and certain wants—the need to satisfy its own wants—the will to prevail and it acts accordingly.

◆

I think one of the things that has been sharpened here for all of us—the gentleman talking about architecture was also talking about academic freedom—he was talking about the academic program—you cannot talk about architecture without talking about everything—you can't talk about financial planning in isolation—you can't talk about the organizational planning. Actually those who can are looking at things from different points of view. We're all standing around a circle looking into the circle and everything that we do and everything that we say impinges upon the total. I think that's been sharpened here very beautifully as we've listened to people talk about financial planning, architectural planning, etc. They were all talking about the same thing—and there are very fine lessons with this, although I suppose it isn't a very big idea—it isn't a very subtle idea—it's an important one . . . we shall get total institutional involvement to the extent that we possibly can; we shall not allow physical planning of ours to occur in which the academic people are not involved—we shall not allow financial planning to occur in which other agencies are not involved.

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We have a myth, for example, that if we can do just what we please, everything will be just fine—we're the only people in society—we academic people who could be permitted this kind of freedom . . . independent intellectuals and not governed by selfishness. I think we're going to look into these things and we're going to live with our coordinating councils—if we have them—our state systems—if we have them. I think we're going to live with the involvement of people off the campus and I think we're going to look back upon some of the myths we have about independence at the present time as a bit naive and perhaps we shall recognize what I confess I've come to think as true, though I don't think I thought it years ago— and that is that we can stress our own autonomy and our own independence to a point at which it ceases to become relevant to the society in which we find ourselves and we're now living in an age in which we can be irrelevant to our society. We will not even be supported unless we are relevant to society.

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We're in a position of being so inundated with daily crises, of trying to clean up problems that are hang-overs from the past, that the difficulty rising above all of this to do any long-range planning with long-range objectives is not really one that we've overcome as yet.

The Coordinating Council in California is placed in the position of an international court of justice—adjudicating disputes—which is not exactly an enviable task.

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We have planning at the campus level—we have planning in the headquarters—we have planning by the coordinating council, and then we have a couple of dimensions that nobody has thought much about—we have planning by the department of finance, by the legislative analyst's office, and by the legislature itself. This makes for very interesting problems in attempting to come up with some sort of long range forecast for the future.

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We're overburdened with formulas which were developed many years ago and were applied by rigid control.

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The thing that has been emphasized again and again is the need for adequate data on which to base decisions about planning.

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Some of the things suggested here have been most attractive—the systems approach which we discussed, particularly the notion of constructing a model, which should with the aid of computers give us answers to a lot of questions. What will happen if our 18 campuses convert to a year around operation? We're doing this on the basis of cost estimates without the kind of information that we ought to have.

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One thing that struck me was the long discussion of cooperation versus autonomy in the system of higher education because this is one of the biggest problems that we have. Unless we are able to solve this question of what are the respective roles of the individual faculties, the individual colleges and our system as a whole, I think our system will be in trouble.

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Behind every discussion of planning, whether you go into systems analysis, whether you talk in the more traditional terms Homer Babbidge used about the identification of ends and the orientation of means to them, there lies behind the idea of planning, *accountability*, if only to some set of rules and values and usually to some set of people or some constituency, in Mr. Cuthbertson's terms which, as he puts it, demands something of the institution.

If you're talking about goals and the relation of means to them, whose goals of the organization are they going to be?

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Who says organization says oligarchy.

◆

Should the faculty participate and in what part should it participate? Should the faculty be involved in the matter of formulating the original plan for a curriculum, for college development, for the emphasis on research and instruction, for maybe even more organizational things than that? Or should a professional staff or the administration of the institution set up plans which spell all of these things out and then give them to the faculty as a whole or to some representative body to criticize? This is a big issue in some institutions right now.

◆

It seems to me that the question of whose goal, as we said before, relates to the question of whose technique should be used. Should we have a professional planning staff, should you have two professional planning staffs — physical and academic — should you have three—physical, academic and fiscal —should you have four—physical, academic, fiscal and an independent kind of consultant who comes in and criticizes everybody, or should the president and his faculty committees do it?

◆

It takes rare courage to make a lot of waves by a continual re-examination of anything fundamental. What most administrators don't want to do above all is make waves. There are many faculty members who don't want it either because they think they're too busy teaching the courses they think are good, and wonder why aren't they left alone.

He made quite a point of 'he is president, he will do it.'...that he should be the planner.

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I didn't agree with him. I think he was expressing the viewpoint of a president of an institution. I felt that very strongly. I could hardly believe some of the things I was hearing. The head of a state institution was talking like the head of a private institution.

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What is it about system analysis that is going to help us make better judgments than if we didn't have system analysis, but just had ordinary analysis?

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Sometimes we make a distinction between decision making and rule following—that is, where we do know the consequences, the outcome of certain decisions, it no longer becomes a decision making process but it becomes a rule following process. I suspect that system analysis isn't going to give you a set of rules, it's going to give you a set of alternatives and perhaps clarify the consequences of different alternatives, to give you some basis for a better decision. But it's going to have to come back to somebody to make a decision. System analysis isn't going to provide a set of rules.

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I think one of the reasons why so much of our educational research and so much of our educational planning, so called, has been so terrible is because we haven't had any criteria in mind.

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